Breast Cancer Risk: 
Genes and the Environment

Teacher Information

Summary
Explore environmental and genetic risk factors for developing breast cancer. Students complete pedigree-based cancer occurrence and BRCA1 DNA tests for a family. They complete a survey on risk factors associated with breast cancer and then analyze their survey responses based on information in a Breast Cancer Risks poster. They analyze models to determine if childhood exposure to DDT increases risks of breast cancer.

Core Concepts
- An individual's risk of developing breast cancer is influenced by a number of factors such as specific genes, lifestyle choices, hormonal factors, and environmental exposures.
- People's perception of breast cancer risks may, or may not, be supported by scientific evidences.
- Exposure to DDT before birth or during childhood may increase risks for breast cancer.

Kit contains
- Simulated BRCA1 Genetic Test sheet in plastic bag used for staining
- Tube of DNA stain
- Graduated measuring cup
- Plastic stirrer
- 3 plastic bags and beads to model effects of DDT insecticide exposure: no exposure, exposure before puberty, exposure after puberty
- My Family Pedigree
- Breast Cancer Risks poster

Teacher Provides
- Tap water
- Safety goggles
- Paper towels for clean up

Time Required
Two 40-minute class periods + homework

Warning: Choking Hazard
This Science Take-Out kit contains small parts. Do not allow children under the age of seven to have access to any kit components.
Suggested Resources

Breast Cancer Risk and Environmental Factors by the National Institute of Environmental Health Sciences describes research being done on environmental risk factors related to breast cancer. [http://www.niehs.nih.gov/health/assets/docs_a_e/environmental_factors_and_breast_cancer_risk.pdf](http://www.niehs.nih.gov/health/assets/docs_a_e/environmental_factors_and_breast_cancer_risk.pdf)

The National Geographic article DDT Linked to Fourfold Increase in Breast Cancer Risk provides a summary of research that links prenatal DDT exposure and breast cancer. Particularly interesting is the researchers’ analysis of the limitations of the research study that clearly indicates the need for additional environmental health research. [http://news.nationalgeographic.com/2015/06/15616-breast-cancer-ddt-pesticide-environment/](http://news.nationalgeographic.com/2015/06/15616-breast-cancer-ddt-pesticide-environment/)

Reusing Breast Cancer Risk: Genes and the Environment kits

Teachers will need to instruct students on how to handle clean-up and return of the reusable kit materials. For example, teachers might provide the following information for students:

<table>
<thead>
<tr>
<th>Discard</th>
<th>Rinse with water and dry with paper towel</th>
<th>Return to kit</th>
</tr>
</thead>
</table>
| • Bag containing used BRCA1 Genetic Test and DNA stain solution | • Graduated measuring cup  
• Stirrer | • Graduated measuring cup  
• All bags with labels and/or beads  
• Tube labeled “DNA Stain”  
• Stirrer  
• Breast Cancer Risks poster |

Note: Students may keep the My Family Pedigree

Refills for Breast Cancer Risk: Genes and the Environment kits are available at [www.sciencetakeout.com](http://www.sciencetakeout.com). The 10 Kit Refill Pack includes the following materials:

• DNA Stain  
• Scoop for refilling DNA Stain tubes  
• 10 simulated BRCA1 Genetic Tests sheets  
• 10 plastic bags for BRCA1 Genetic Tests  
• 10 copies of My Family Pedigree
Read these instructions before using Science Take-Out kits

Parental or Adult Supervision Required
This kit should be used only under the supervision of an adult who is committed to ensuring that the safety precautions below, and in the specific laboratory activity, are followed.

Safety Goggles and Gloves Strongly Recommended
We encourage students to adopt safe lab practices, and wear safety goggles and gloves when performing laboratory activities involving chemicals. Safety goggles and gloves are not provided in Science Take-Out kits. They may be purchased from a local hardware store or pharmacy.

Warning: Choking and Chemical Hazard
Science Take-Out kits contain small parts that could pose a choking hazard and chemicals that could be hazardous if ingested. Do not allow children under the age of seven to have access to any kit components. Safety Data Sheets (SDS) provide specific safety information regarding the chemical contents of the kits. SDS information for each kit is provided in the accompanying teacher instructions.

Chemicals Used in Science Take-Out Kits
Every effort has been made to reduce the use of hazardous chemicals in Science Take-Out kits. Most kits contain common household chemicals or chemicals that pose little or no risk.

General Safety Precautions
1. Work in a clean, uncluttered area. Cover the work area to protect the work surface.
2. Read and follow all instructions carefully.
3. Pay particular attention to following the specific safety precautions included in the kit activity instructions.
4. Goggles and gloves should be worn while performing experiments using chemicals.
5. Do not use the contents of this kit for any other purpose beyond those described in the kit instructions.
6. Do not leave experiment parts or kits where they could be used inappropriately by others.
7. Never taste or ingest any chemicals provided in the kit – they may be toxic.
8. Do not eat, drink, or apply make-up or contact lenses while performing experiments.
9. Wash your hands before and after performing experiments.
10. Chemicals used in Science Take-Out experiments may stain or damage skin, clothing or work surfaces. If spills occur, wash the area immediately and thoroughly.
11. At the end of the experiment, return ALL kit components to the kit plastic bag. Dispose of the plastic bag and contents in your regular household trash.

No blood or body fluids from humans or animals are used in Science Take-Out kits. Chemical mixtures are substituted as simulations of these substances.
Breast Cancer Risk: 
Genes and the Environment

Part 1: A Family History of Breast Cancer

My family reunion began with a memorial service for my cousin Laura, who died from breast cancer when she was only 45 years old. After the service, three of my cousins (Margie, Shelly and Alice) revealed that they had breast cancer.

My cousin Margie explained that she had a genetic test that showed she has a mutated BRCA1 gene that increases the risk for breast and ovarian cancer. Once my cousins and I realized that we might have inherited the mutant BRCA1 gene, all of my cousins agreed to be tested for the mutant BRCA1 gene.

<table>
<thead>
<tr>
<th>BRCA1 Gene and Cancer Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutations in the BRCA1 gene are known to increase the risk of breast and ovarian cancers in women. Approximately 50% to 65% of women born with a mutation in the BRCA1 gene will develop breast cancer by age 70, and 35% to 46% will develop ovarian cancer by age 70. For males, a BRCA1 gene mutation increases their risk for breast cancer and prostate cancer.</td>
</tr>
</tbody>
</table>

1. Your lab kit contains a pedigree for my family. List the names of family members who have or had breast cancer.
2. Does having one normal BRCA gene and one mutant BRCA1 gene increase a person’s risk for developing breast cancer? Support your answer with information from the text and diagram above.

_________________________________________________________________________

_________________________________________________________________________

3. Explain how a woman could inherit a mutant BRCA1 gene from her father.

_________________________________________________________________________

_________________________________________________________________________

4. Your lab kit contains a bag with a BRCA1 Genetic Test sheet that has been spotted with DNA (gene) samples from my family. You will analyze the genetic test to determine which family members inherited the mutated BRCA1 gene. Note: Leave the test sheet in the bag.

![BRCA1 Genetic Test Diagram]

Each circle contains a DNA (gene) sample from a family member.
5. To make the DNA visible on the genetic test, you need to stain the BRCA1 Genetic Test with a DNA stain:
   a) Fill the plastic measuring cup with 20 ml of tap water.
   b) Pour the contents of the DNA Stain tube into the water in the cup.
   c) Stir until the DNA stain has dissolved.
   d) Pour the DNA stain solution from the cup into the plastic bag that contains the BRCA1 Genetic Test.
   e) Close the bag completely then lay the bag flat on your desk or table so that the DNA stain comes in contact with all parts of the BRCA1 Genetic Test paper.

6. Look at the BRCA1 Genetic Test paper in the bag. Do not remove the paper from the bag.
   - A pink spot indicates the presence of a BRCA1 gene mutation that increases the risk for breast cancer.
   - Lack of a pink spot indicates that the BRCA1 gene mutation is not present.

7. Darken the circles in the diagram below to show the pink spots that indicate the family members who carry a BRCA1 gene mutation.

<table>
<thead>
<tr>
<th>Me (Sue)</th>
<th>Kathy</th>
<th>Jim</th>
<th>Margie</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Gary</td>
<td>Shelly</td>
<td>Jen</td>
<td>Fred</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Bill</td>
<td>Alice</td>
<td>Mary</td>
<td></td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

8. Discard the bag that contains the BRCA1 Genetic Test paper.

9. On the My Family Pedigree sheet, write “X” under the name of each cousin (the bottom row of symbols) who has the BRCA1 gene. Note: Laura had not been tested for the mutant BRCA1 gene.
10. Is it possible to have a mutated BRCA1 gene and not have breast cancer? Support your answer with evidence from the pedigree and results of the genetic tests.

_________________________________________________________________________
_________________________________________________________________________

11. Which males on the pedigree have an increased risk for breast cancer and prostate cancer?

_________________________________________________________________________

12. List TWO reasons why it might be important that both males and females get tested to determine if they inherited the BRCA1 gene mutation.

• _______________________________________________________________________
• _______________________________________________________________________

13. Is it possible to have breast cancer and not have a mutated BRCA1 gene? Support your answer with evidence from the pedigree and results of the genetic tests.

_________________________________________________________________________
_________________________________________________________________________
Part 2: A Survey - Risk Factors for Breast Cancer

Although genetics is a contributor to breast cancer development, scientific studies have estimated that inherited genes account for only 5–10% of breast cancers. Other risk factors, such as those listed in Column 1 of the chart below, may increase a woman’s chance of developing breast cancer.

1. In Column 2 of the chart below (What Do YOU Think?), write Yes, No, or Possibly to indicate whether you think each risk factor increases a woman’s risk of developing breast cancer.

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Possible Risk Factors for Breast Cancer</strong></td>
<td><strong>What Do YOU Think?</strong></td>
<td><strong>Scientific Evidence?</strong></td>
</tr>
<tr>
<td></td>
<td>Is it a breast cancer risk factor?</td>
<td>Is it a breast cancer risk factor?</td>
</tr>
<tr>
<td></td>
<td>Yes, No, or Possibly</td>
<td>Yes, No, or Possibly</td>
</tr>
<tr>
<td>Aging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell phones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being overweight or obese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High dose estrogen birth control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals in plastics and cosmetics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heredity (family history)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides such as DDT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking or second-hand smoke</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Use the information in the Breast Cancer Risks poster to complete Column 3 of the chart above. Write Yes, No, or Possibly to indicate whether scientific research provides evidence that each risk factor increases breast cancer risk.
3. Some factors associated with breast cancer risk cannot be controlled (changed). List at least four risk factors for breast cancer that you cannot control.
   • 
   • 
   • 
   • 

4. Other factors associated with breast cancer risk can be controlled (changed) by making lifestyle choices. List four actions that people could take to reduce their exposure to known risk for breast cancer.
   • 
   • 
   • 
   • 

5. Some of the “possible” risk factors for breast cancer include exposure to chemicals in the environment. What type of research has led scientists to suspect that these chemicals may increase the risks for breast cancer in humans?

   

6. What should be done to determine if the “possible” risk factors are or are not linked to increased risk for breast cancer in humans?

   

7. Many scientists recommend taking a “better safe than sorry” approach when considering exposure to possible environmental risk factors. List four things you might be cautious about using if you take the “better safe than sorry” approach to breast cancer risk factors.
   • 
   • 
   • 
   • 

8. Do you think that avoiding all known risk factors will prevent breast cancer? Explain your answer.

   


Part 3: DDT, Breast Cancer, and Windows of Susceptibility

Shelly and Alice both have breast cancer. They do not have the BRCA1 gene, so they both wonder what caused their breast cancer.

Shelly saw a news program about animal research on breast cancer. The research showed that rats exposed to the chemical DDT had higher rates of breast cancer than rats that were not exposed to DDT. Shelly thinks that her breast cancer and Alice’s breast cancer were caused by DDT that was sprayed to kill mosquitos in the town where they lived when they were children. Shelly and Alice remember playing outdoors when the DDT fogging trucks came through their neighborhood. Alice even has a picture that her mother took of them playing in the DDT fog cloud.

Alice did some Internet research and the information below summarizes what she learned about DDT and breast cancer.

<table>
<thead>
<tr>
<th>DDT and Breast Cancer</th>
</tr>
</thead>
</table>
| DDT (dichlorodiphenyltrichloroethane) is a chemical insecticide that was used during the 1940s through the 1960s. DDT spraying is an effective way to kill mosquitos that carry diseases such as malaria, encephalitis, and West Nile virus. However, the use of DDT in the United States was banned in 1972 because research showed that DDT persisted in the environment and had devastating effects on some wildlife. Many women were exposed to DDT spraying before DDT was banned. DDT is still sprayed in some countries where diseases caused by mosquitos are a serious health problem.

The chemical structure of DDT is similar to the chemical structure of estrogens (female sex hormones). Because of this, DDT can act as an endocrine disruptor. Endocrine disruptors are chemicals that interfere with the normal action of hormones produced by the body’s endocrine system. Because estrogen has been associated with breast cancer risk, it was suggested that DDT exposure might also be a risk factor for breast cancer.

Until recently, most research studies found no evidence that DDT exposure increases the risk of breast cancer in humans.
1. What was DDT used for when Shelly and Alice were children?

_________________________________________________________________________

2. Why was the use of DDT banned in the United States?

_________________________________________________________________________

3. Why is DDT still used in some countries?

_________________________________________________________________________

4. What is an endocrine disruptor?

_________________________________________________________________________

5. Why does DDT interfere with the normal action of female sex hormones?

_________________________________________________________________________

6. Does DDT increase the risk of breast cancer for women?

_________________________________________________________________________

Alice saw a TV news interview with a scientist who had done research on the link between DDT exposure and breast cancer. The scientist had a theory that there are certain times during human development, called “windows of susceptibility”, when people are more susceptible to (affected by) exposure to environmental risk factors. The scientist hypothesized that females who were exposed to DDT before puberty (before their breasts are fully developed) or before birth have an increased risk of breast cancer later in life.

7. How would you define “windows of susceptibility”?

_________________________________________________________________________

8. What is the “window of susceptibility” that the scientist is investigating?

_________________________________________________________________________
9. Observe the bead model in the bag labeled “Not Exposed to DDT in Insecticides.” This bag contains 40 beads. **Do NOT open this bag.**
   - White beads represent women who did not develop breast cancer before age 60.
   - Red beads represent women who developed breast cancer before age 60.

10. How many of the 40 beads in the “Not Exposed to DDT in Insecticides” model are red beads representing women who developed breast cancer before age 60. _______

11. What is the approximate chance of a woman developing breast cancer before age 60 if she was **not exposed to DDT** in insecticides? Express your answer as % chance. Explain how you arrived at your answer.
    ______% chance

The scientist found that women who were exposed to DDT before puberty (either during childhood or before birth) were 4 times more likely to develop breast cancer before they reached age 60. Exposure to DDT after puberty did _not_ increase a woman’s risk of developing breast cancer.

12. What is the approximate chance of a woman developing breast cancer before age 60 if she was exposed to DDT **before puberty**? Express your answer as % chance. Explain how you arrived at your answer.
    ______% chance

13. Make a model using 40 beads to represent the results for 40 women who were exposed to DDT before puberty. Put the appropriate number of white and red beads into the bag labeled “Exposed to DDT in Insecticides Before Puberty.” Show your work or explain how you arrived at your answers.
   - How many white beads did you put in the bag? _______
   - How many red beads did you put in the bag? _______

Show your work or explain how you arrived at your answers.
14. What is the approximate chance of a woman developing breast cancer before age 60 if she was exposed to DDT after puberty? Express your answer as % chance. Explain how you arrived at your answer.

_______ % chance

15. Make a model using 40 beads to represent the results for 40 women who were exposed to DDT after puberty. Put the appropriate number of white and red beads into the bag labeled “Exposed to DDT in Insecticides After Puberty.”

- How many white beads did you put in the bag? ______
- How many red beads did you put in the bag? ______

Show your work or explain how you arrived at your answers.

16. Some communities today are considering using DDT spraying programs to control rising mosquito populations.

- What is one benefit of DDT spraying?

______________________________________________________________________

- What are two risks of DDT spraying?

______________________________________________________________________
______________________________________________________________________

- Why are people most concerned about exposure of pregnant women and children to DDT?

______________________________________________________________________
______________________________________________________________________

- Would you support the use of DDT spraying in your community? Explain why or why not by weighing the risks and benefits?

______________________________________________________________________
______________________________________________________________________
**Section 1**  
**Chemical Product and Company Information**

<table>
<thead>
<tr>
<th><strong>Science Take-Out</strong></th>
<th>80 Office Park Way</th>
<th><strong>CHEMTREC 24 Hour Emergency</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pittsford, NY 14534</td>
<td><strong>Phone Number (800) 424-9300</strong></td>
</tr>
<tr>
<td></td>
<td>(585)764-5400</td>
<td>For laboratory use only. Not for drug, food or household use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Product</strong></th>
<th>Sodium Carbonate, Anhydrous</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Synonyms</strong></td>
<td>“DNA Stain”</td>
</tr>
</tbody>
</table>

**Section 2**  
**Hazards Identification**

**Signal word:** WARNING  
**Pictograms:** GHS07  
**Target organs:** None known.  

<table>
<thead>
<tr>
<th><strong>GHS Classification:</strong></th>
<th>Eye irrit. (Category 2A)</th>
</tr>
</thead>
</table>

**GHS Label information:**  
**Hazard statement(s):**  
H319: Causes serious eye irritation.  

**Precautionary statement(s):**  
P264: Wash hands thoroughly after handling.  
P280: Wear protective gloves/protective clothing/eye protection/face protection.  
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P337+P313: If eye irritation persists: Get medical advice/attention.  

**Ca Prop 65 - This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.**

**Section 3**  
**Composition / Information on Ingredients**

<table>
<thead>
<tr>
<th><strong>Chemical Name</strong></th>
<th><strong>CAS #</strong></th>
<th><strong>%</strong></th>
<th><strong>EINECS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carbonate</td>
<td>497-19-8</td>
<td>100%</td>
<td>207-838-8</td>
</tr>
</tbody>
</table>

**Section 4**  
**First Aid Measures**

**INGESTION:** Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.  
**INHALATION:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.  
**EYE CONTACT:** Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.  
**SKIN ABSORPTION:** Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

**Section 5**  
**Fire Fighting Measures**

**Suitable Extinguishing Media:** Use any media suitable for extinguishing supporting fire.  
**Protective Actions for Fire-fighters:** In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool.  
**Specific Hazards:** Sodium carbonate reacts with hydrated lime to form caustic soda. Special care should be taken where lime and sodium carbonate are handled in the same area.

**Section 6**  
**Accidental Release Measures**

**Personal Precautions:** Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation.  
**Environmental Precautions:** Avoid runoff into storm sewers and ditches which lead to waterways.  
**Containment and Cleanup:** Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

**Section 7**  
**Handling and Storage**

**Precautions for Safe Handling:** Read label on container before using. Do not wear contact lenses when working with chemicals. Keep out of reach of children. Avoid contact with eyes, skin and clothing. Do not inhale dusts. Use with adequate ventilation. Avoid ingestion. Wash thoroughly after handling. Remove and wash clothing before reuse.  
**Conditions for Safe Storage:** Store in a cool, well-ventilated area away from incompatible substances.

**Section 8**  
**Exposure controls / Personal Protection**

<table>
<thead>
<tr>
<th><strong>Exposure Limits:</strong></th>
<th><strong>Chemical Name</strong></th>
<th><strong>ACGIH (TLV)</strong></th>
<th><strong>OSHA (PEL)</strong></th>
<th><strong>NIOSH (REL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carbonate</td>
<td>None established</td>
<td>None established</td>
<td>None established</td>
<td>None established</td>
</tr>
</tbody>
</table>

**Engineering controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or face shield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.  
**Respiratory protection:** None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA approved respirator.
Section 9 Physical and Chemical Properties

**Appearance:** Solid, white powder.
**Odor:** No odor.
**Odor threshold:** Data not available.
**pH:** Data not available.
**Melting/Freezing point:** 864°C (1587°F)
**Boiling point:** Decomposes
**Flash point:** Not flammable.

**Evaporation rate (Water = 1):** Data not available
**Flammability (solid/gas):** Data not available.
**Explosion limits:** Lower/Upper: Not flammable.
**Vapor pressure (mm Hg):** Data not available
**Vapor density (Air = 1):** 0.7 (water)
**Relative density (Specific gravity):** 2.533
**Solubility:** 17% @ 20°C in water.

**Partition coefficient:** Data not available.
**Auto-ignition temp.:** Data not available.
**Decomposition temp.:** Data not available.
**Viscosity:** Data not available.
**Molecular formula:** Na₂CO₃
**Molecular weight:** 105.99

Section 10 Stability and Reactivity

**Chemical stability:** Stable
**Hazardous polymerization:** Will not occur.

**Conditions to avoid:** Excessive temperatures. Hygroscopic material, avoid moisture.

**Incompatibilities with other materials:** Acids cause decomposition liberating gaseous carbon dioxide. When mixed with lime dust and water, corrosive and caustic soda may be produced.

**Hazardous decomposition products:** Carbon dioxide.

Section 11 Toxicological Information

**Acute toxicity:** Oral-rat LD₅₀: 4090 mg/kg ; Inhalation-rat LC₅₀: 2.3 mg/l/2 hours ; Dermal-rat LD₅₀: 2210 mg/kg

**Skin corrosion/irritation:** Data not available

**Serious eye damage/irritation:** Data not available

**Respiratory or skin sensitization:** Data not available.

**Germ cell mutagenicity:** Data not available

**Carcinogenity:** Data not available

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcogen or potential carcogen by OSHA.

**Reproductive toxicity:** Data not available

**Aspiration hazard:** Data not available

**STOT-single exposure:** Data not available

**STOT-repeated exposure:** Data not available

**Potential health effects:**

- Inhalation: May be harmful if inhaled. Causes respiratory tract irritation.
- Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed.
- Skin: May be harmful if absorbed through skin. Causes skin irritation.
- Eyes: Causes eye irritation.

**Signs and symptoms of exposure:** Burning sensation, cough, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting.

**Additional information:** RTECS #: VZ4050000

Section 12 Ecological Information

**Toxicity to fish:** LC₅₀ - Lepomis macrochirus (Bluegill) - 300 mg/l - 96 h.

**Toxicity to daphnia and other aquatic invertebrates:** EC₅₀ - Daphnia magna (Water flea) - 265 mg/l - 48 h

**Toxicity to algae:** No data available

**Persistence and degradability:** No data available

**Bioaccumulative potential:** No data available

**Mobility in soil:** No data available

**PBT and vPvB assessment:** No data available

**Other adverse effects:** An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

**UN/NA number:** None assigned
**Reportable Quantity:** No

**Shipping name:** Not Regulated
**Marine pollutant:** No

**Hazard class:** Not applicable

**Exceptions:** No

**Packing group:** Not applicable

**2012 ERG Guide #** Not applicable

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>CERLCA (RQ)</th>
<th>RCRA code</th>
<th>DSL</th>
<th>NDSL</th>
<th>WHMIS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carbonate</td>
<td>Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>E;D2B</td>
</tr>
</tbody>
</table>

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees.


Revision Date: September 28, 2015  Supercedes:
FICHE TECHNIQUE DE SÛRETÉ

GÉNÉRAL CODE D'ENTREPOSAGE VERT

Section 1 L’information de produit chimique et de compagnie

Science Take-Out
80 Office Park Way
Pittsford, NY 14534
(585)764-5400

CHEMTREC 24 Numéros De Téléphone
De Secours D’Heure (800) 424-9300
Pour l’usage de laboratoire seulement.
Pas pour l’usage de drogue, de nourriture ou de ménage.

Produit
Carbonate de sodium, anhydre

Synonymes
“DNA Stain”

Section 2 Identification De Risques

Mention d’avertissement: AVERTISSEMENT
Pictogrammes: GHS07
Les organes cibles: Aucun connu

Déclarations de précaution:
P264: Se laver les mains après avoir manipulé.
P337+P313: Si l’irritation oculaire persiste: consulter un médecin

CA Prop 65 - Ce produit ne contient pas de produits chimiques connus à l’État de Californie pour causer le cancer, des malformations congénitales, ou toute autre atteinte à la reproduction.

Section 3 Composition / Information Sur Des Ingrédients

<table>
<thead>
<tr>
<th>Nommé Chimique</th>
<th>CAS #</th>
<th>%</th>
<th>EINECS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonate de sodium</td>
<td>497-19-18</td>
<td>100%</td>
<td>207-838-8</td>
</tr>
</tbody>
</table>

Section 4 Mesures De Premiers Soins

INGESTION: Appeler un médecin ou un centre antipoison immédiatement. Provoquer le vomissement seulement si elle est informée par le personnel compétent médicaux. Ne jamais rien donner par la bouche à une personne inconsciente.

INHALATION: Sortir au grand air. Si elle ne respire pas, pratiquer la respiration artificielle. Si la respiration est difficile, donner de l’oxygène. Obtenir des soins médicaux.

CONTACT AVEC LES YEUX: Vérifier et enlever les lentilles de contact. Rincer abondamment à l’eau pendant au moins 15 minutes, en soulevant les paupières inférieures et supérieures de temps en temps. Obtenez une attention médicale immédiate.


Section 5 Mesures De Lutte Contre l’Incendie

Moyens d’extinction: Utilisez des supports adaptés pour éteindre le feu à l’appui.

Actions de protection pour les sapeurs-pompiers: En cas d’incendie, porter un appareil respiratoire NIOSH / MSHA approuvé autonome et un équipement complet de protection. Utiliser un jet d’eau pour maintenir l’incendie réfrigérer les conteneurs exposés.

Dangers spécifiques: Le carbonate de sodium réagit avec la chaux hydratée à la soude caustique de forme. Le soin spécial devrait être pris où le carbonate de chaux et de sodium sont manipulés dans le même secteur.

Section 6 Mesures De Déchargement Accidentel

Précautions personnelles: Évacuer le personnel vers la zone sûre. Utiliser un équipement de protection personnelle comme indiqué dans la Section 8. Assurer une ventilation adéquate.

Précautions environnementales: Éviter tout ruissellement vers les égouts pluviaux et les fossés qui aboutissent aux voies navigables.

Confinement et de nettoyage: Absorbez avec le matériau sec inertes, balaye ou nettoyez à l’aspirateur vers le haut et placez dans un récipient approprié pour la disposition appropriée. Laver la zone de déversement avec du savon et d’eau.

Section 7 Manipulation Et Stockage


Conditions de stockage: Stocker dans un endroit frais et bien aéré, loin des substances incompatibles.
Section 8 Commandes D’Exposition / Protection Personnelle

<table>
<thead>
<tr>
<th>Limites d’exposition:</th>
<th>Nommé Chimique</th>
<th>ACGIH (TLV)</th>
<th>OSHA (PEL)</th>
<th>NIOSH (REL)</th>
</tr>
</thead>
</table>

Contrôles d’ingénierie: Les installations d’entreposage ou d’utilisation de ce matériel doit être équipé d’une douche oculaire et une douche de sécurité et le matériel d’extinction d’incendie. Le personnel doit porter des lunettes de sécurité, des lunettes, ou un écran facial, une blouse de laboratoire ou tablier, des gants protecteurs appropriés. Utiliser une ventilation adéquate pour maintenir les concentrations atmosphériques faible.

Protection respiratoire: Aucun ne devrait être nécessaire dans le laboratoire normal manipulant aux températures ambiante. Si les conditions brumeuses prévaloir, travailler dans la hotte ou de porter un masque respiratoire approuvé NIOSH / MSHA.

Section 9 Propriétés Physiques Et Chimiques

| Apparence: Solide. poudre blanche. | Taux d’évaporation (Eau = 1): Données non disponibles | Coefficient de partage: Données non disponibles |
| Odeur: Aucun odeur. | Inflammabilité (solide / gaz): Données non disponibles. | Auto-inflammation: Données non disponibles |
| Seuil de l’odeur: Données non disponibles. | Limites d’explosivité: Bas / Max: Données non disponibles | Température de décomposition: 1000°C (1832°F) |
| pH: Données non disponibles | Pression de vapeur (mm Hg): Données non disponibles | Viscosité: Données non disponibles. |
| Point de fusion / congélation: 864°C (1587°F) | Densité de vapeur (Air = 1): Données non disponibles | Formule moléculaire: Na₂CO₃ |
| Point d’ébullition: Se décompose | Densité relative (gravité spécifique): 2.533 | Poids moléculaire: 105.99 |
| Point d’éclair: Inflammable | Solubilité (s): 17% @ 20°C |

Section 10 Stabilité Et Réactivité

Stabilité chimique: Stable Polyémisation dangereuse: N’aura pas lieu.

Conditions à éviter: Les températures excessives. Le matériel hygroscopique, évitent l’humidity.

Incompatibilités avec d’autres matériaux: Decomposition de cause d’acides libérant l’anhydride carbonique gazeux. Une fois mélangée avec de l’eau la poussière et de chaux, la soude corrosive et caustique peut être produite.

Produits dangereux de décomposition: Anhydride carbonique.

Section 11 L’Information Toxicologique

Toxicité aiguë: Oral-rat LD₅₀: 4090 mg/kg ; Inhalation-rat LC₅₀: 2.3 mg/l/2 hours ; Dermal-rat LD₅₀: 2210 mg/kg

La corrosion de la peau et l’irritation: Données non disponibles

Des lésions oculaires graves / Irritation: Données non disponibles

Respiratoire ou sensibilisation de la peau: Données non disponibles

Mutagénicité des cellules germinales: Données non disponibles

Cancérégène: Données non disponibles

NTP: Aucun composant de ce produit présent à des niveaux supérieurs ou égaux à 0,1% n’a été identifié comme cancérigène reconnu ou présumé par NTP.

IARC: Aucun composant de ce produit présent à des niveaux supérieurs ou égaux à 0,1% n’a été identifié comme cancérigène probable, possible ou confirmé par IARC.

OSHA: Aucun composant de ce produit présent à des niveaux supérieurs ou égaux à 0,1% n’a été identifié comme cancérigène ni comme cancérigène possible par OSHA.

Reproductive toxicity: Données non disponibles

STOT-exposition unique: Données non disponibles

STOT-exposition répétée: Données non disponibles

Risque d’aspiration: Données non disponibles

Effets d’une surexposition:

Inhalation: Peut être nocif en cas d’inhalation.

Ingestion: Peut être nocif en cas d’ingestion.

Peau: Peut causer une légère irritation.

Yeux: Peut causer une légère irritation.

Les signes et les symptômes de l’exposition: Pour le meilleur de notre connaissance les propriétés chimiques, physiques et toxicologiques n’ont pas été étudiées à fond. Les données spécifiques n’est pas disponible. Exercice des procédures appropriées afin de minimiser les dangers potentiels.

Informations complémentaires: RTECS #: V24050000

Section 12 L’Information Écologique

Toxicité pour les poissons: LC₅₀ - Lepomis macrochirus (Bluegill) - 300 mg/l - 96 h

Toxicité pour les daphnies et autres invertébrés aquatiques: EC₅₀ - Daphnia magna (Water flea) - 265 mg/l - 48 h

La corrosion de la peau et l’irritation: Données non disponibles

Des lésions oculaires graves / Irritation: Données non disponibles

Respiratoire ou sensibilisation de la peau: Données non disponibles

Mutagénicité des cellules germinales: Données non disponibles

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Informations complémentaires: RTECS #: V24050000

Section 13 Considérations De Disposition


Section 14 L’Information De Transport

Numéro UN / NA: Non applicable

Classe de danger: Non applicable

Exceptions: Non applicable

Date de révision: 28 September, 2015 Remplace: 2012 ERG Guide #:

Section 15 L’Information De Normalisation

Un produit chimique est considéré comme inscrit si le numéro CAS pour la forme anhydre est sur la liste d’inventaire.

<table>
<thead>
<tr>
<th>Composant</th>
<th>TSCA</th>
<th>CERLCA (RQ)</th>
<th>RCRA code</th>
<th>DSL</th>
<th>NDSL</th>
<th>Classification SIMDUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonate de sodium</td>
<td>Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Listed</td>
<td>Not Listed</td>
<td>D2B; E</td>
</tr>
</tbody>
</table>

Date de révision: 28 September, 2015 Remplace: