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 a *What Science Says* factsheet. They analyze data from an experiment indicating that environmental exposures during childhood (before puberty) may increase 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 data.
- Windows of susceptibility during childhood (before puberty) may be involved in breast cancer risk factors.

Time Required
Two 40-minute class periods + homework

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

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

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 types of research being done to explore environmental risk factors related to breast cancer.

http://www.niehs.nih.gov/health/assets/docs_a_e/environmental_factors_and_breast_cancer_risk.pdf

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  
  • Note: Students may keep the *My Family Pedigree* | • Graduated measuring cup  
  • Stirrer | • Graduated measuring cup  
  • Three bags of beads  
  • Tube labeled “DNA Stain”  
  • Stirrer  
  • *Breast Cancer Risks—What Science Knows* |

Refills for *Breast Cancer Risk: Genes and the Environment* kits are available at 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*
Kit Contents Quick Guide

DNA Stain

Measuring Cup

Stirrer

BRCA 1 Genetic Test

Me (Sue)  Kathy  Jim  Margie
Gary  Shelly  Jen  Fred
Bill  Alice  Mary

Not Exposed to DDT in Insecticides

Exposed to DDT in Insecticides After Age 14

Exposed to DDT in Insecticides Before Age 14

Breast Cancer Risk — What Science Knows

Gender: Women can develop breast cancer, but men do so far less than women.

Aging: The risk of developing breast cancer increases as women get older. Women in the United States are about 12 times more likely to develop breast cancer as men are.

Inheritance and Family History: About 5% to 10% of breast cancer cases are thought to be inherited, meaning that there are small changes in genes that are inherited from parents. Women who have a family history of breast cancer are more likely to develop the disease.

Race and Ethnicity: Caucasian women are more likely to develop breast cancer than African-American women, but African-American and other women are more likely to die of breast cancer.

Menopause Replacement Therapy: Using combined hormone therapies and replacement therapy after menopause increases the risk of getting breast cancer. It may also increase the chances of getting hormone breast cancer.

Obstetric History: The use of oral contraceptives increases the risk of breast cancer by 1.5 to 2 times. Women who use oral contraceptives are more likely to develop breast cancer than women who do not use them.

Hormone Receptors: Breast cancer is classified into two main types. The type of hormone receptor is important in determining the best treatment options.

Physical Activity: Evidence is growing that physical activity reduces breast cancer risk. In one study, the American Cancer Society, in 2008, reported that women who engage in regular physical activity have a 25% lower risk of breast cancer than women who do not.

Genetics and Breast Cancer: Many studies have looked at the role of genes on breast cancer risk. The BRCA1 and BRCA2 genes are identified as major risk factors. People who inherit a mutation in one of these genes have a greatly increased risk of developing breast cancer.

Risk Factors: Many factors contribute to the risk of developing breast cancer. Risk factors include age, family history, genetics, and lifestyle factors. Some risk factors cannot be changed, such as age and family history, while others can be changed, such as lifestyle and dietary factors.

My Family Pedigree

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www.sciencetakeout.com
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

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.

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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gary</th>
<th>Shelly</th>
<th>Jen</th>
<th>Fred</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bill</th>
<th>Alice</th>
<th>Mary</th>
</tr>
</thead>
<tbody>
<tr>
<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 - Other 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 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></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heredity (family history)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth control pills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hormone replacement therapy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking alcohol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being overweight or obese</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals in plastics and cosmetics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides such as DDT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco use and smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiperspirants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Use the information in the Breast Cancer Risks—What Science Knows to complete Column 3 (What Science Knows) 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. Research has shown that in addition to genes, there are other risk factors for breast cancer that you cannot change. Read the information provided in the Breast Cancer Risks—What Science Knows sheet. List at least four risk factors for breast cancer that you cannot change.
   • _______________________________________________________________________
   • _______________________________________________________________________
   • _______________________________________________________________________
   • _______________________________________________________________________

4. List three actions that people could take to reduce their risk for breast cancer.
   • _______________________________________________________________________
   • _______________________________________________________________________
   • _______________________________________________________________________

5. Will all people with known environmental risk factors develop breast cancer as they become older? Explain your answer.
   _______________________________________________________________________
   _______________________________________________________________________

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

DDT (dichlorodiphenyltrichloroethane) is a chemical insecticide that was used during the 1940s through the 1960s. The use of DDT in the United States was banned in 1972 after research showed that DDT persisted in the environment and had devastating effects on some wildlife.

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.

Many women were exposed to DDT spraying before DDT was banned. Even today, women may be exposed to low concentrations of DDT that remain as contaminants in the environment. Because estrogen has been associated with breast cancer risk, it was suggested that DDT exposure might also be a risk factor for breast cancer.

In the past, most research studies found no evidence that DDT exposure increases the risk of breast cancer. However, some recent studies concluded that there may be certain times, called “windows of susceptibility” during human development when a human is more susceptible to (affected by) exposure to environmental risk factors. For example, Japanese women who were undergoing puberty when they were exposed to high levels of radiation from atomic bombs during World War II showed higher rates of breast cancer when they reached their 50s and 60s.

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

2. What is an endocrine disruptor?

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

4. Why is DDT exposure considered as a potential breast cancer risk factor?

5. How would you define “windows of susceptibility”?
Researchers wondered if there might be a window of susceptibility for DDT exposure. They hypothesized that females who are exposed to DDT before puberty (before their breasts are fully developed) might have an increased risk of breast cancer later in life.

Your lab kit contains three bags of beads representing women involved in the researchers’ study. Each bag contains 40 beads representing 40 women. DO NOT OPEN THE BAGS.

- White beads represent women who did not develop breast cancer before age 50.
- Red beads represent women who developed breast cancer before age 50.

Observe these three bags of beads to answer questions 6 through 9.

6. What is the approximate chance of a woman developing breast cancer during her lifetime if she was not exposed to DDT in insecticides? Express your answer as % chance.
   _____ % chance

7. What is the approximate chance of a woman developing breast cancer during her lifetime if she was exposed to DDT in insecticides after age 14? Express your answer as % chance.
   _____ % chance

8. What is the approximate chance of a woman developing breast cancer during her lifetime if she was exposed to DDT in insecticides before age 14? Express your answer as % chance.
   _____ % chance

9. Does this research support the hypothesis that there is a window of susceptibility during which exposure to DDT increases a female’s risk for breast cancer? Support your answer with relevant data.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
SAFETY DATA SHEET
GENERAL STORAGE CODE GREEN

Section 1  Chemical Product and Company Information

Science Take-Out 80 Office Park Way  CHEMTREC 24 Hour Emergency
Pittsford, NY 14534  Phone Number (800) 424-9300
(585)764-5400  For laboratory use only. Not for drug, food or household use

Product  Sodium Carbonate, Anhydrous
Synonyms  “DNA Stain”

Section 2  Hazards Identification

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

GHS Classification:
Eye irrit. (Category 2A)

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>Chemical Name</th>
<th>CAS #</th>
<th>%</th>
<th>EINECS</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

Exposure Limits:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH (TLV)</th>
<th>OSHA (PEL)</th>
<th>NIOSH (REL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium carbonate</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 faceshield, 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(ies):** 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 carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity:** Data not available

**Aspiration hazard:** 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 fleas) - 265 mg/l - 48 h

**Toxicity to algae:** No data available

**Bioaccumulative potential:** No data available

**Mobility in soil:** No data available

**Persistence and degradability:** 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

**Packing group:** Not applicable

**Exceptions:** No

**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>CERCLA (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:
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.

<table>
<thead>
<tr>
<th>Produit</th>
<th>Carbonate de sodium, anhydre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonymes</td>
<td>“DNA Stain”</td>
</tr>
</tbody>
</table>

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

Classification par le GHS:
Eye irrit. (Catégorie 2A)
Renseignements sur l’étiquette GHS: Mention de danger:
H319: Provoque une sévère irritation des yeux.

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

Section 10 Stabilité Et Réactivité

Stabilité chimique: Stable

Conditions à éviter: Les températures excessives. Le matériel hygroscopic, évitez l'humidité.

Incompatibilités avec d'autres matériaux: Décomposition de cause d'acides libérant l'anhydride carbonique gazeux. Une fois mélange 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 Toxiqueologique

- **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
- **Les lésions oculaires graves / Irritation**: Données non disponibles
- **Respiratoire ou sensibilisation de la peau**: Données non disponibles
- **Mutagenicité des cellules germinales**: Données non disponibles
- **Cancérogènes**: 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 fl ea) - 265 mg/l - 48 h
- **Toxicité pour les algues**: Pas de données disponible
- **Persistance et dégradabilité**: Pas de données disponible
- **Mobilité dans le sol**: Pas de données disponibles
- **Autres effets indésirables**: Un danger pour l’environnement ne peut pas être exclu dans l’éventualité d’une manipulation ou d’élimination.

Section 13 Considérations De Disposition


Section 14 L'Information De Transport

- **Numéro UN / NA**: Non applicable
- **Nom d’expédition**: Non réglé
- **Classe de danger**: Non applicable
- **Groupe d’emballage**: Non applicable
- **Quantité à déclarer**: Non
- **Polluant marin**: Non

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>CERCLA (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>

Section 16 L'Information Additionnelle