

Overview

Through a scavenger hunt for information students will discover what potash is, what it is used for, interesting facts and will consider the impact of potash on their lives.

Duration: One Class

Materials:

- Question Sheets
- Teacher Answer Sheets
- [Potash Poster On-line](#)

Notes to Teacher: This is an introductory lesson on potash.

Prior Knowledge:

Before attempting these activities students should have some understanding of the following:

- The difference between rocks and minerals.

Instructional Methods:

- Brainstorming
- Individual learning, research



Learning Outcomes and Indicators

RM4.2 Assess how human uses of rocks and minerals impact self, society, and the environment. [DM]

- b) Identify objects in their local environment that are made from rocks and minerals (e.g., nickel, table salt, pottery, cement, brick, jewellery, bicycle, nutrients, battery, copper wiring, soda can, plumbing pipe, and sidewalk).
- g) Discuss economic benefits associated with mineral extraction and refining, including related careers, in Saskatchewan.
- k) Assess their own and their family's impact on natural resources based on their current lifestyle.

CR4.1 Comprehend and respond to a variety of grade-level texts (including contemporary and traditional visual, oral, written, and multimedia texts) that address: identity, community, social responsibility, and support response with evidence from text and from own experiences.

- b) View, listen to, and read a variety of texts related to theme or topic of study and show comprehension by:
 - retelling and explaining the ideas and information presented in texts
 - responding to and interpreting the texts, and explaining and supporting response with evidence from the texts.

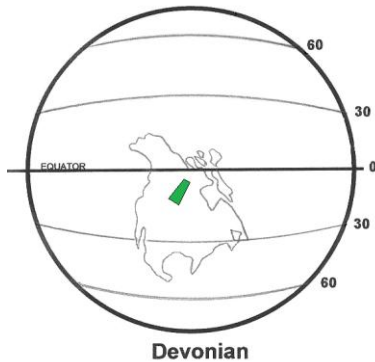
Source: [Saskatchewan Evergreen Curriculum](#)

Big Picture Questions

1. What is Potash?
2. Why is it so important?

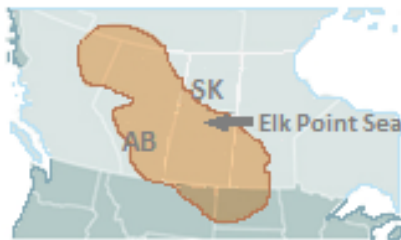
Background Information

Around 380 million years ago Saskatchewan was located south of the equator.



(Modified from Storer, J., 1989)

A large salt water sea covered most of Saskatchewan and Alberta stretching from the Arctic to the Gulf of Mexico. It was a tropical time with coral reefs forming.



Modified from Globe and Mail, Friday, Nov. 05, 2010

Over time the coral reefs occurring to the west and north of the Elk Point Sea grew and blocked the flow of water from the open ocean to the north. The sea became restricted with little to no influx of fresh sea water into the deeper parts of the sea basin (the southern part of Saskatchewan). The warm, dry climate at the time evaporated the water. Concentrations of mineral salts increased until crystal layers began to form on the sea floor, similar to how salt or sugar crystals form in a glass when a saturated solution evaporates (Storer, J., 1989). The evaporites, which include Saskatchewan's potash deposits, formed for over 2 million years until normal circulation of the sea water returned as did sea life. No fossils are found in the Prairie Evaporite unit. It is thought that animals and plants could not live in the sea at that time due to the high salinity (Storer, J., 1989).

The potash deposits occur diagonally across the southern plains of Saskatchewan. They gently slope to the south from a 1,000 metre depth along a north-west line through Rocanville, Esterhazy and Saskatoon to more

than a 1,600 metre depth at Belle Plaine and up to 3,000 metres depth in North-eastern Montana and North Dakota (see Mineral Resource Map of Saskatchewan).

In Saskatchewan, potash is extracted from the deep underground deposits (generally 1000 m or 1 km deep) using either conventional (underground tunnels and mining machines) or solution mining (brine is pumped down wells into the potash unit, dissolved and pumped back up to the surface) methods.

A band 40-48 km wide at the shallow northern edge of the deposit can be mined by conventional underground methods. At depths greater than 1,500 m in the south, solution mining is more economical and safer.

Potash is an important mineral to Saskatchewan and the world. The mineral's name refers to several forms of potassium salt, the most important being potassium chloride or KCL. It is one of the world's three important fertilizers. Used in combination with nitrogen and phosphate, potash increases the yields of such important crops as corn, soybeans, coffee, and rice.

Potash plays a central role in helping feed the world's growing population. Approximately 95% of world potash production is used as fertilizer, the rest being used in a variety of chemical and manufactured products.

Potash was first discovered in Saskatchewan during the early 1940s while drilling for oil. Exploration during the remainder of the decade helped geologists define the magnitude and richness of Saskatchewan's deposits.

It was not until 1962 that potash was being successfully mined in Saskatchewan. The province had the world's first solution mine in 1964 and by 1971 all of Saskatchewan's ten world class potash mines were in production. Today, Saskatchewan is the 2nd largest potash producer.

The important role played by potash in meeting agriculture's needs has helped make it an increasingly important mineral to Saskatchewan's economy. Revenue from the sale of potash benefits the province in many ways. It supports potash workers and their families through the payment of wages and benefits. It provides an ongoing stimulus to local businesses from the industry's purchases of goods and services. Finally, it helps to support important government social and economic programs through the payment of taxes and royalties.

Grade 4 Rocks, Minerals and Erosion: Potash, What is it?

Sylvite (potash) was proclaimed Saskatchewan's Mineral Emblem in 1996.

Vocabulary

potash
sylvinitite

sylvite

THE ACTIVITY

Potash, What is it?

(Brainstorming web, Independent research)

Motivational Set (10 minutes)

1. Develop a concept web with the word potash in the center. Have students add their knowledge to the web.

The Activity: Information Scavenger Hunt

1. Hand out the question sheets.
2. Post the SMA poster on a bulletin board have the students go on-line to look at the [Potash Poster](#).
3. Have students search the poster or use the computer to look at the poster as a PDF document, for the answers to the questions.
4. Revisit the potash concept web, have students create their own concept web adding what they have learned.

Assessment Method and Evidence

✓ Concept Flower

- Students will be able to list objects made with potash (eg. Fertilizer for plants/crops, computer screens, medicine, rocket fuel).
- Students will list information, gained from the potash poster, about the potash industry such as mines location, technology (Marrietta Continuous Borer, the importance of potash as a fertilizer.
- Students will show their comprehension of the potash information presented on the poster by retelling/stating the information in the form of a concept flower.

✓ Discussion Questions

- Students will be able to discuss where the potash mines are in Saskatchewan, that the potash mines bring money into Saskatchewan, and people work in the mines.
- Students will look at their family's use of fertilizers on

their plants and lawn, or the use of fertilizers on green spaces in their environment, and be able to discuss if it is necessary in their lives and what impact their/the use of potash has to the mining industry.

- Students will be able to show comprehension of the potash poster information when answering the discussion questions by explaining and supporting their response with evidence from the poster.

Summary

By reading the SMA Potash poster and answering the discussion questions, students have learned many interesting fact about the mineral, what it is, where it is mined, what it is used for, and have considered what the effect of using potash as a fertilizer has on themselves, the community, the mining company and the resource.

Resources

Saskatchewan Potash Interpretive Centre:

<http://www.potashinterpretivecentre.com/index2.htm>

SMA Potash Poster. Available free from: Saskatchewan Mining Association Website:

http://www.saskmining.ca/uploads/news_files/70/sma-potash-poster-v14.pdf

Potash Corporation of Saskatchewan Website:

<http://www.potashcorp.com/>

International Fertilizer Association Website:

<http://www.fertilizer.org/ifa/default.asp>

Agrium Website: <http://www.agrium.com>

The Mosaic Company Website:

<http://www.mosaicco.com>

Fuzesy, A. (1981): Potash in Saskatchewan; Saskatchewan Energy and Mines Report No.181, 44p.

Holter, M.E. (1969): The Middle Devonian Prairie Evaporite of Saskatchewan; Department of Mineral Resources-Geological Sciences Branch-Industrial Minerals Division-Province of Saskatchewan; Report No.123, 134p.

Storer, J., (1989): Geological History of Saskatchewan.

Saskatchewan Museum of Natural History,. Regina:
Government of Saskatchewan

Vocabulary

Potash: Is Saskatchewan's provincial mineral. Potash is the common name for the potassium rich ore mined in Saskatchewan. It is made up of the minerals sylvite, halite, sometimes carnallite, clay and iron oxides.

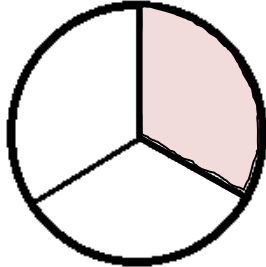
Sylvinite: is the most important ore for the production of potash in North America. It is a mechanical mixture of sylvite (KCl, or potassium chloride) and **halite** (NaCl, or sodium chloride).

Sylvite: is **potassium chloride (KCl)** in natural **mineral** form. It forms very similar to normal rock salt, **halite** (NaCl). Sylvite is colorless to white with shades of yellow and red due to inclusions. It has a Mohs hardness of 2.5. Sylvite has a salty taste with a distinct bitterness. Sylvite is one of the last **evaporite** minerals to precipitate out of solution. As such, it is only found in very dry saline areas. Its principal use is as a potassium fertilizer.

Discussion Questions – Teacher’s Answer Sheet

1. What is the chemical name for potash? *Potassium chloride*
2. What is another name for it? *Sylvite*
3. How much of the worlds potash is mined here in Saskatchewan? Show how much on this pie diagram.

More than 1/3rd of the world’s potash is mined here.



4. Name three mining companies who have potash mines in Saskatchewan.
PotashCorp, Mosaic Canada and Agrium Inc.
5. Why do plants need fertilizer?
Fertilizer provides the nutrients that help plants to grow.
6. Why do plants need potash?
It is necessary for photosynthesis, and it makes plants strong.
7. How did potash get its name?
In the past people would evaporate salts out of a pot with water and ashes of burned trees. Pot + ash. The ash from burned trees still had the potassium in them that they took out of the ground when they grew.
8. What else is potash used for? *Computer screens, medicine and rocket fuel!*
9. What are some other interesting facts about potash mines?
 1. *It is warm in the underground mines, about 27°C year round.*
 2. *Some of the mines are 1,000m below the surface of the earth.*
 3. *Potash mines are like underground cities, there are roads and trucks.*
10. Check at home. Is fertilizer put on your lawn or your plants to make them grow better?
Take a look at the fertilizer package, it will have three numbers. The first is nitrogen, the second is phosphorus and the third is potassium. Check and see how much potassium (K) is in your fertilizer.
Miracle grow: 15-30-15 15% of the fertilizer is potassium (potash)
Lawn fertilizer: winter – 30-0-10; summer – 31-3-8
If you don’t use fertilizer do a web search for lawn fertilizer to find the amounts of NPK.
Some familiar products are Scott’s turfbuilder and Miracle Grow.
11. How important is it to have nice looking lawns? *Students answers will vary.*

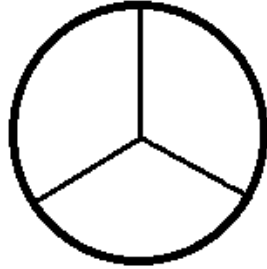
If everyone wants nice looking lawns and buys fertilizer what does this mean for the potash mining company, the community and the potash resource?

Some may think it is important to have nice looking lawns. If everyone wants nice looking lawns they will be buying fertilizer. This will increase demand for the product which means the potash companies will mine for more, The company will make money, the company will provide jobs for the local community and the resource will gradually get depleted.

Name: _____

Questions

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5. Why do plants need fertilizer?
6. Why do plants need potash?
7. How did potash get its name?
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9. What are some other interesting facts about potash mines?

10. Check at home. Is fertilizer put on your lawn or plants to make them grow better?

Take a look at the fertilizer package, it will have three numbers. The first is nitrogen (N), the second is phosphorus (P) and the third is potassium (K). Check and see how much potassium (K) is in your fertilizer.

If you don't use fertilizer do a web search for lawn fertilizer to find the amounts of NPK. Some familiar products are Scott's turfbuilder and Miracle Grow.

11. How important is it to have nice looking lawns?

If everyone wants nice looking lawns and buys fertilizer what does this mean for
a) the potash mining company?

b) the community?

c) the potash resource?

WHAT I HAVE LEARNED: Write something you have learned about potash in each petal.

