CHAPTER 1: USEFUL CHEMISTRY

Science 24

Then and Now

- Chemistry has changed a lot over the past 100 years
- Allow for many new products or them to be made easier – clothes (nylon, polyester, kevlar), food production, and more (margarine, detergent etc.)

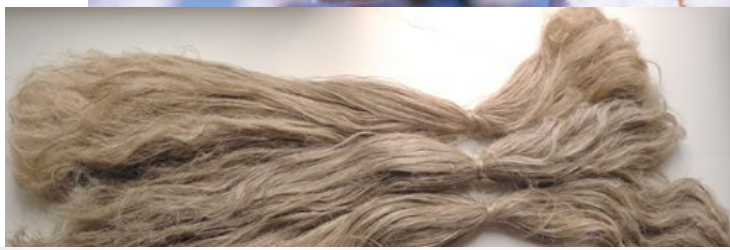
Farming

- More and more people live in urban areas – only 2.5% of Canadians live on farms
- Advances in chemistry and technology have helped them produce a higher **yield**
- Use tractors, irrigation systems, and **synthetic** chemicals
- Pesticides – **Herbicides –** kill unwanted plants and **Insecticides** – kill unwanted insects

Chemistry for Cleaning

- For cleaning ourselves and our homes
- In the past animal fats were used to make soap, now many manufactures have replaced them with plant oils – often more effective and smell nice ☺
- Many cleaners include strong bases
- Bases have a pH higher than 7

Chemistry and Synthetics



- Clothing primarily made of **synthetic fibres**
- Used to be made of natural fibres such as cotton, flax, wool, or silk
- **Cotton** – harvested from the seed pods of plants
- **Flax** – comes from the stem of flax plants to make linen
- **Wool** – taken from animals such as sheep or goats
- **Silk** – comes from the cocoon of silk worms

Synthetic Fibres

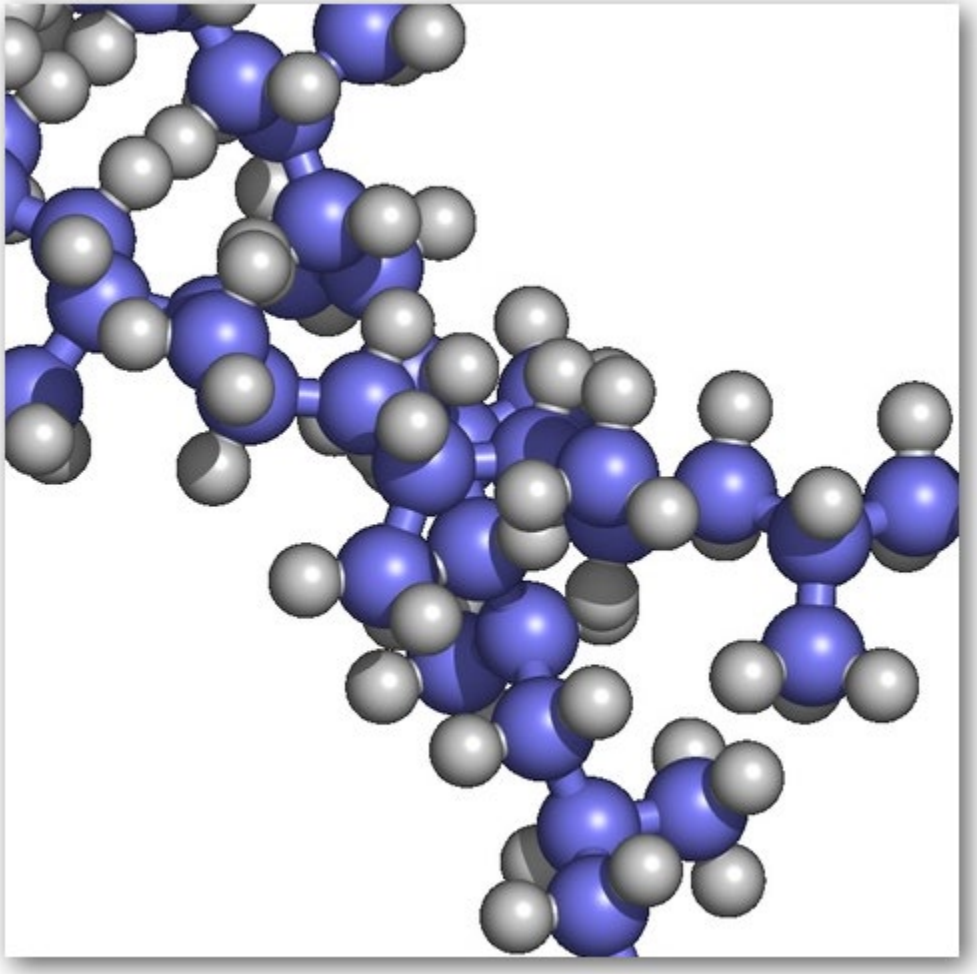
- **Nylon** – discovered in the 1930s but thought to be useless until it was discovered how far it could stretch
- **Polyester** – used in apparel and home furnishings, from shirts, jackets, hats, blankets, upholstered furniture and computer mouse mats.
- **Gore Tex** – waterproof, breathable fabric
- **Kevlar** - a synthetic fiber of high tensile strength used especially protective gear such as helmets and vests.

Plastics, Polymers, and Alloys

- Known as **synthetic polymers**
- **Polymers –** type of compound that is found in nature – silk from silkworms or spiders, sap from rubber tree
- Chemists can alter them to fit different needs

Polymer

- Type of compound that is found in nature – silk from silkworms or spiders, sap from rubber tree
- Composed of many repeating subunits
- Both natural and synthetic polymers play an essential role in everyday life



Synthetic Polymers

Polymer	Properties	Uses

Alloys

- A mixture of metals or a metal and other element
- Most metal objects you see are actually alloys – cars, jewelry, cooking tools
- Before alloys things that were made of metals were strong, but very heavy and prone to rust

Alloy Applications

- Alloys for cars can have the strength and durability of iron, along with the resistance of chromium
- Gold – soft and flaky– alloy is a mix of gold, silver, and copper

Chemistry at Home

- Looking through your cupboards you will find many chemicals with certain symbols on them.
- Cleaners are often highly corrosive used to break down dirty and make them easy to wash away
- The 3 basic symbols are:

Common Chemicals

Chemical	Where Found	How it Works

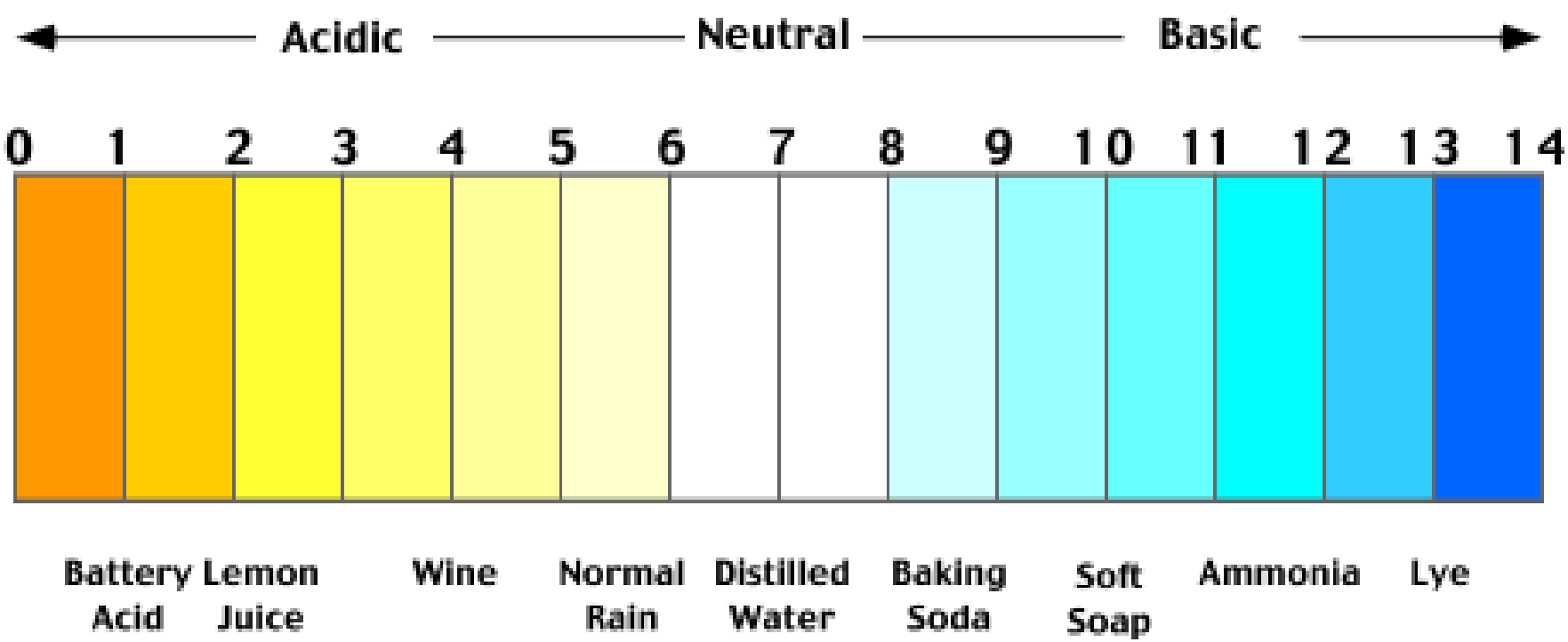
Cooking with Chemicals

- Knowing how different ingredients will mix and react is a crucial part of the art of cooking
- Eg. Yeast making bread rise
- Yeast is a simple organism that needs food, warmth, and moisture to survive. It converts sugar and starch into carbon dioxide which in turn makes the bread rise or expand
- Citric fruits and rhubarb react with kitchen tools made of aluminum and cause them to rust
- Instead chefs use tools built of stainless steel

Chemistry in the Workp

- Involved in most careers some way or another
- Automotive Repair – Paints, cleaners, and vehicular fluids all undergo chemical reactions.
- Hair Salon – Pretty much every aspect, except the actual hair cutting. Shampoo, colour dyes, gels, etc.
- Office – Common items like printer ink, fire extinguishers, among others
- Construction Site – demolition explosives, preservatives, high power adhesives and cleaners

pH scale


Acidic
Neutral
Basic
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Battery Acid
Lemon Juice
Wine
Normal Rain
Distilled Water
Baking Soda
Soft Soap
Ammonia
Lye

Cosmetics

- Have been around for a long time
- Some are harmless but others aren't
- Many are actually tested on animals to see if they cause any irritation
- In recent years many protest groups have formed to stop this testing and many companies are learning more about the chemistry behind cosmetics to avoid this

WHMIS

- **W**orkplace **H**azardous **M**aterial **I**nformation **S**ystem
- Provide information on safety and precautions of different chemicals
- **MSDS – M**aterial **S**afety **D**ata **S**heets
- Provide detailed information that does not fit on product

MATERIAL
DATA
SAFETY
SHEETS

WHMIS Symbols

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Quick Questionnaire

- Can be anonymous
- 1 things you enjoyed in science 14
- 1 things you found confusing or didn't enjoy
- 1 thing you hope to learn in science 24