**Lesson 27**

* List the 6 Platinum Group Elements (PGEs)

- palladium (Pd), rhodium (Rh), ruthenium (Ru), osmium (Os), and iridium (Ir) and platinum

* Describe the significance of PGEs throughout history

-before 16th century is rare, only on Egype casket box for example

- 16th century - discovery in central america. Threw into river hoping it turns to gold

- 19th century - found in Russia, used in dinner and evening wear

- scientific and industrial use due to resistance to corrosion

-Canada (Sudbury) and South Africa (Bushveld) around the turn of the 20th century

- By the 1970's, platinum jewellery was seen worldwide.

* Describe the diagnostic properties of PGEs

Platina - little silver

silver white color

- very dense (2x of lead)

- 1828 to 3306 Kelvin melting points

- very inert, lower thermal expansion, good electrical conductivity, strong at high Temps

- high MP means hard to work with

- components in other non-metal minerals (such as tellurides and arsenides)

- The most common PGE minerals are Pt-Fe alloy minerals (such as ferroplatinum), sperrylite (PtAs2), and cooperite (PtS)

- mixture of 6 PGEs

* Describe the basic structure and habit of crystalline Platinum Group Minerals (PGMs)

- isometric, though Os and Ru are hexagonal if pure

- two subsets of PGEs leading to Ru-Os rich mineral grains and Pt-Ir-Pd-Rh rich mineral grains

- Single crystals usually interpenetrating cubes

* Describe the numerous modern uses of PGEs

- hard, and always white/silverish

- common as white jewellery (Rhodium)

- chains, pins, watch backs

- machine components

- Ru in electronics

-Ir and Pd with Pt to add durability and resistence

- Rh in jewellery (coating)

- autocatalyst in Euro

-

* Recognize the differences between platinum group elements, platinum group metals, and platinum group minerals.

**Lesson 28**

* Describe the important geological settings of PGE deposits

- Sudbury Complex in Canada, the Bushveld Complex in South Africa, the Stillwater Complex in the U.S.A., the Great Dyke in Zimbabwe and the Noril'sk Region in Russia

- global geology of PGE deposits also defines the geography of PGE supply

- the large layered intrusion model that characterizes the Bushveld Complex and several other deposits is the most important

* Describe the typical grades and sizes of PGE deposits

- grades of PGE deposits do not need to be very high due to the high value of the metal and good recovery rates of the metals from the ores

- only need about 4 ppm

- others (1 ppm in gold and copper mines) are secondary commodities

-

* Compare the grades and sizes of PGE deposits to other precious metal deposits
* Describe the local distribution of PGEs in Canada

- Sudbury Complex in Canada

- hosts many metal deposits of Ni, Cu, PGEs, Zn, Pb, U, and Au

- 3 parts: The Sudbury Igneous Complex (SIC) (base), footwall (the impact zone)( under SIC), sedimentary breccia rocks (filling of crater, contains the subsequent sedimentary layers of the Whitewater Group.)

 - Ni-Cu-PGE deposits are found at the bottom of the SIC

* Describe the geography of worldwide PGE supply and demand

Bushveld Complex in South Africa - 80%