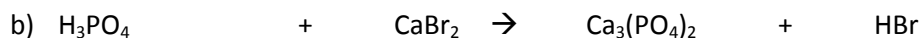
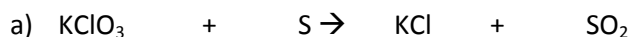


ST January 2012 Review

1. Classify as a chemical or physical change:

- Two powders are crushed and an enormous amount of heat and sound are released _____
- A compound of CH_3OH boils until it all evaporates _____
- A nail is hammered into a wall _____
- Skin forming a scab after it has been slightly cut. _____
- Five precious Belgian chocolates melt in your mouth _____
- Paint dries. Its mass *increases* as it forms a compound with oxygen. _____
- Zinc and oxygen combine to form ZnO _____
- Radio waves pass through your body _____

2. Balance the following equations:

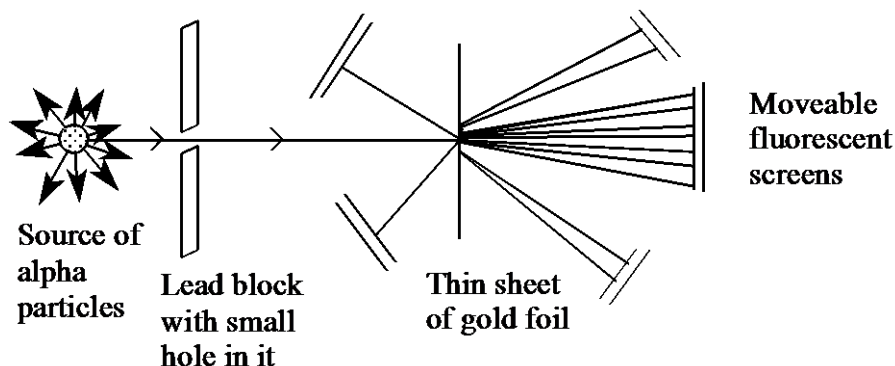


3. You observe the reaction between CaS and 2HCl which produces CaCl_2 and the poisonous H_2S .

The mass before the reaction was 143 g. The products only weighed 111 grams. What happened? Was mass conserved? If so why aren't the masses equal?

- A student dissociated water using acid and electricity. If he measured approximately 27ml of hydrogen, how many ml of oxygen was probably obtained?
- As a result of his famous experiment in which a thin sheet of gold foil was bombarded with alpha (α) particles, **Rutherford** significantly changed the atomic model proposed by Thomson.

The diagram below shows the trajectory of alpha particles passing through a thin sheet of gold foil or, in rare instances, being deflected on its surface.



Explain the results of this experiment.

6. Use your knowledge of the periodic table families to fill in the blanks
- The smallest alkaline earth metal is _____
 - The family that reacts with most metals is the _____
 - The least reactive family is the _____
 - _____ + Br₂ → 2 LiBr

- How many electrons does a neutral atom of boron have?
- How many protons are in a neutral atom of Ar?
- Which, if any, of the following has more electrons? P⁻³ or S⁻²
Show work

10. Your school's lab technicians have designed an interesting lab that uses calcium (Ca) but the school's shipment of calcium has not yet arrived. Rather than disappointing their students, the lab technicians decide not to cancel the lab and try to find a replacement for calcium.

a) Which element could replace calcium in the experiment? Explain your answer.

b) Draw a Rutherford- Bohr, a Thomson model and a Lewis diagram of calcium and the replacement element.

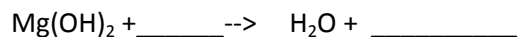
11. While building a machine for the science fair, you test a number of substances to determine how well they can conduct an electrical current.

Substance A	A sugar cube
Substance B	An iron nail
Substance C	Sea water (NaCl)
Substance D	Table salt (NaCl)
Substance E	HCl Solution
Substance F	NaOH solution

There is a chemical spill that releases magnesium hydroxide ($\text{Mg}(\text{OH})_2$) into the soil. Originally the pH of the soil is 7, after the spill the pH is 9. Two products: aqueous hydrogen iodide (HI) and potassium hydroxide (KOH) are available to neutralize the chemical spill.

a) Choose the product that will neutralize the spill. Justify your answer.

b) Complete and balance the chemical equation for this reaction.



12. Which of the following is the **most concentrated** solution? (2 marks)

- a) 30 g of solute / 5L of solution
- b) 5 g of solute / L of solution
- c) 0.1 g of solute /10L
- d) 3500 ppm solution

13. What type of energy(chemical, electrical, etc) is exemplified by each of the following:

- a) The energy stored in unburned oil
- b) The energy flowing through the copper wire leading to a lamp
- c) The energy released by a radioactive nucleus
- d) The energy of visible light

14. If an engine is 15 % efficient, how much energy does it waste if is supplied with 2000 kJ worth of gasoline? Show work.

15. TRUE? Or FALSE? And if false, explain why.

- a) Nitrogen fixing bacteria harm plants
- b) The nitrogen in the air cannot be used directly by plants or animals
- c) After decomposing, urea eventually becomes nitrates.
- d) In the carbon cycle plants absorb carbon dioxide and use it to make sugars
- e) If a plant is eaten or if it decomposes, the carbon dioxide returns to the air.
- f) Rain can return some carbon to the land and oceans by dissolving CO₂.
- g) Carbonates that are part of shells are formed from a reaction involving H₂CO₃
- h) Volcanoes play no role in the carbon cycle.
- i) When the CO₂ levels in the atmosphere are disturbed, it could lead either to global cooling or warming.
- j) Sedimentary rocks are often layer-shaped and are often found near the ocean.
- k) With pressure, metamorphic rocks become igneous rocks.
- l) SiO₂, found in glass, is an example of a mineral.
- m) A substance found to be composed of the following could be a rock.
 - [SiO₂](#) — 72.04%
 - [Al₂O₃](#) — 14.42%
 - [K₂O](#) — 4.12%
 - [Na₂O](#) — 3.69%
 - [CaO](#) — 1.82%
 - [FeO](#) — 1.68%
 - [Fe₂O₃](#) — 1.22%
 - [MgO](#) — 0.71%
 - [TiO₂](#) — 0.30%
 - [P₂O₅](#) — 0.12%
 - [MnO](#) — 0.05%

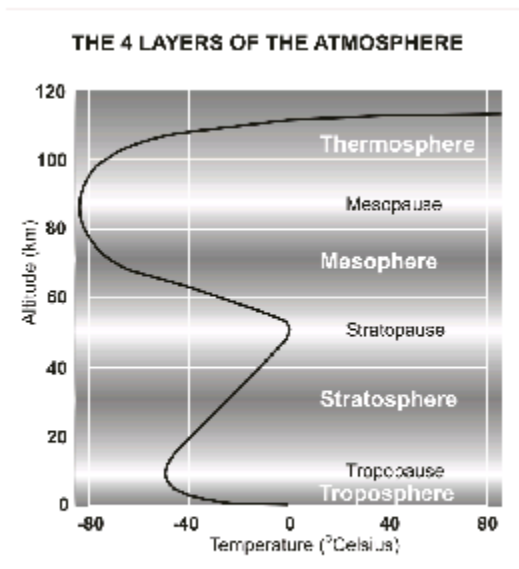
16. a) In the diagram, which layer of the atmosphere is not shown?

b) Which layer has the highest density and therefore the highest atmospheric pressure?

c) Why does the temperature increase with altitude in the stratosphere---which is the opposite of what happens in the troposphere?

d) It is the layer where most meteors burn up upon entering the atmosphere.

e) Charged atoms are found in this layer.



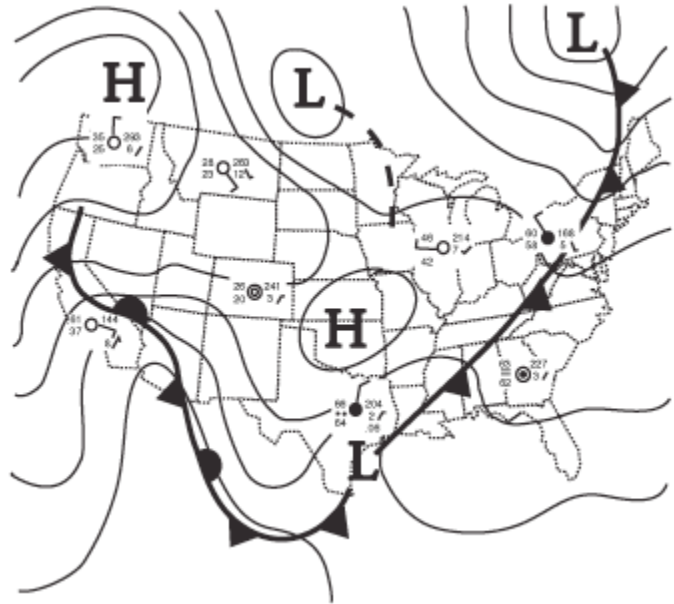
The dark line shows how temperatures change with height in the different layers of the atmosphere

17. In the so-called coriolis effect, what changes the expected direction of winds in cyclones and anticyclones?

18. a) In the weather map shown, what two parts of the United States are experiencing nice sunny weather?

b) What country is experiencing an occluded front?

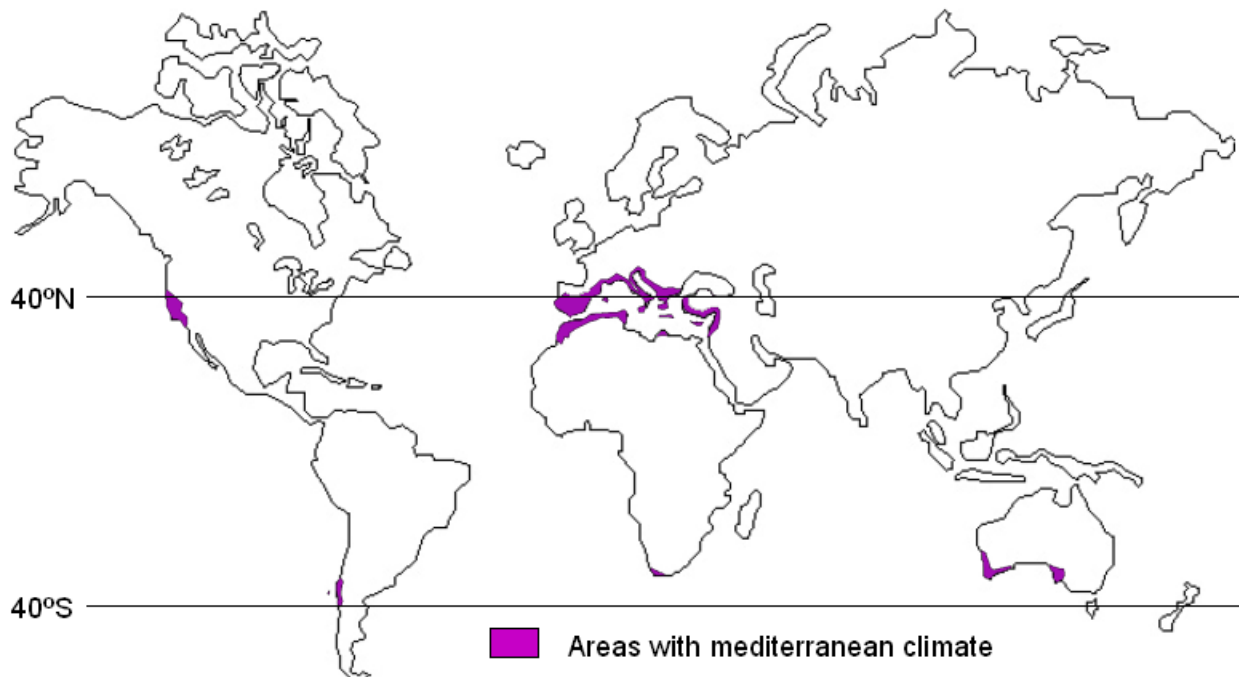
c) What Canadian province is possibly experiencing thunderstorms or a snowstorm?



19. a) How many low tides are there in a week?

b) Aside from the moon's gravity what else is responsible for the earth's tides?

20. What biome is found in the shaded regions?



21. What tree-filled wetland is found in Florida's everglades?
22. a) Symbiotic(living partnership) creatures dominate which land biome?
b) Symbiotic(living partnership) creatures dominate which marine biome?
23. What factor influences the type of biome for both terrestrial and marine biomes?
24. What profile or layer of the soil is not affected by weathering?
25. What profile or layer of the soil is home to the bacteria nodules of the nitrogen cycle?