Name: _____ Date: _____

1 Crude titanium (IV) oxide is treated with chlorine and carbon to yield the liquid titanium (IV) chloride. Carbon dioxide and carbon monoxide are also liberated in this process.

2 Hydrogen sulfide is a foul smelling compound, that when in solution, will combine with aqueous lead (II) nitrate to produce nitric acid and the precipitate lead (II) sulfide.

3 Lead metal and lead (IV) oxide in sulfuric acid produce lead (II) sulfate and water. This is the reaction in a common lead-acid car battery.

4 Phosgene, $COCl_2$, was once used as a war gas. It is poisonous because when it is inhaled, it reacts with water in the lungs to produce hydrochloric acid, which causes severe lung damage, leading ultimately to death. Carbon dioxide is also produced.

5 Acetylene (C_2H_2) can be manufactured from the reaction of water and calcium carbide, CaC_2. Solid calcium hydroxide is a second product.

6 Nitrogen monoxide and oxygen exist in equilibrium with nitrogen dioxide.

7 An early method for producing chlorine was by reacting pyrolusite (manganese (IV) oxide) with hydrochloric acid. Manganese (II) chloride and water were byproducts.

8 Gastric juice, which contains hydrochloric acid, reacts with the aluminum hydroxide in antacid tablets to produce aluminum chloride and water.

9 At elevated temperatures limestone, calcium carbonate, decomposes to form lime (calcium oxide) and carbon dioxide.

10 Acrylonitrile, C_3H_3N, is the starting material for the production of synthetic fibers called acrylics. It can be made from propylene, C_3H_6, by reaction with nitrogen monoxide. Water and nitrogen are byproducts.

11 Nitric acid is manufactured by the Ostwald process, in which nitrogen dioxide reacts with water. Nitrogen monoxide is a byproduct.

12 A sample of limestone (which contains calcium carbonate) is treated with oxalic acid to give water, carbon dioxide, and the precipitate calcium oxalate.

13 The methyl alcohol (CH_3OH) in alcohol burners combines with oxygen to produce water vapor and carbon dioxide.

14 Carbon disulfide burns in oxygen to give carbon dioxide and sulfur dioxide.

15 The first step in the production of phosphoric acid requires the reaction with phosphorous and oxygen to yield tetraphosphorous decoxide.

16 Methyl salicylate, $C_8H_8O_3$ (oil of wintergreen), is prepared by heating salicylic acid with methanol, CH_3OH. Water is a second product of this reaction.

17 Nickel (II) sulfate reacts with sodium phosphate to give a pale yellow green precipitate of nickel (II) phosphate and a solution of sodium sulfate.

18 Concentrated nitric acid is put on copper wire. Water and copper (II) nitrate is produced in solution, along with a brownish gas, nitrogen monoxide.

19 Methanol, CH_3OH, is prepared industrially from the reaction of carbon monoxide and hydrogen.

20 Hydrogen gas reacts with elemental sulfur to give the smelly, toxic gas hydrogen sulfide which can in turn decompose back to its components.

21 Zinc metal is obtained from zinc oxide, by reaction at high temperature with carbon monoxide. Carbon dioxide is also produced.

22 A laboratory volcano can be made from ammonium dichromate. When ignited, the compound decomposes in a fiery display, producing nitrogen, water vapor, and the solid chromium (III) oxide. Additionally, 315 KJ are liberated in this process.

23 Tungsten metal is used to make incandescent bulb filaments. The metal is obtained from the yellow tungsten (VI) oxide, by reaction with hydrogen. Water is a byproduct.

24 When dinitrogen pentoxide, a white solid, is heated it decomposes to nitrogen dioxide and oxygen.

25 Sodium reacts with water to produce sodium hydroxide and hydrogen gas.

26 Oxygen difluoride is a colorless, very poisonous gas that reacts rapidly with water vapor to produce oxygen, hydrogen fluoride, and 318 kJ of heat.

27 Hydrogen cyanide is prepared from the reaction of methane (CH_4), ammonia, and oxygen. Water is an additional product in this platinum catalyst process.

28 Tungsten (IV) carbide is very hard and is used to make cutting tools and rock drills. Tungsten (IV) carbide is produced from direct combination of the elements and occurs at 1400 degrees Celsius.

29 Solutions of sodium hypochlorite are sold as bleach (e.g. Clorox). They are prepared by the reaction of chlorine and sodium hydroxide. Sodium chloride and water are also produced in the reaction.

30 20.6 kJ is produced with hydrogen sulfide vapors as hydrogen gas combines with sulfur, in a reversible process.