

EXAM: GASES, SOLUTIONS and CHEMICAL REACTIONS

Name:

Group:

- 1** A tank contains a solution of nitric acid 350 g/L. The density of that solution is 1.2 g/mL
- a) Calculate the molarity of the solution (0.8 POINTS)
 - b) Calculate the concentration in mass % (1 POINT)
 - c) Calculate the number of molecules of solute in 100 mL (0.7 POINTS)
- ESTIMATED TIME: 15 min
2.5 POINTS

Atomic weights: N=14; O=16; H=1

$$N_A = 6.02 \times 10^{23}$$

- 2** In a container there are 150 mL of a sodium hydroxide solution 36 % in mass; the density is 1.4 g/mL. We add 250 mL of water to that solution. Calculate:
- a) The molarity of the resulting solution (2 POINTS)
 - b) The density of the resulting solution (0.5 POINTS)
- ESTIMATED TIME: 15 min
2.5 POINTS

Atomic weights: Na=23; O=16; H=1

- 3** We want to burn 100 g of propane gas.
- Write the balanced chemical equation and the table of proportions (1 POINT)
 - Calculate the volume of oxygen gas we need at STP (1.5 POINTS)
- ESTIMATED TIME: 5 min
2.5 POINTS

Atomic weights: O=16; H=1; C=12 ; $R = 0.082 \frac{\text{atm.L}}{\text{K.mol}}$

- 4** When hydrogen gas and nitrogen gas combine together, we get ammonia. In a container, we have 70 g of nitrogen and 80 L of hydrogen (at P=2 atm and T=17°C)
- a) Write the balanced chemical equation (0.5 POINTS)
 - b) Determine the limiting reactant (1 POINT)
 - c) Calculate the amount of ammonia in grams (0.5 POINTS)
 - d) Calculate the amount of the reactant in excess (in grams) (0.5 POINTS)
- ESTIMATED TIME: 15 min
2.5 POINTS

Atomic weights: N=14; H=1; $R = 0.082 \frac{\text{atm.L}}{\text{K.mol}}$