

Exam: CHEMICAL CALCULUS

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Name:

Group:

1 A solution of sodium hydroxide contains 25 percent of NaOH by mass. The density of this solution is 1.3 g/mL. Calculate:

- a) the concentration in g/L and mol/L
- b) the volume of this solution that needs to be taken in order to have 50 g of sodium hydroxide
- c) the number of molecules we get if we take 100 mL of that solution

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

Avogadro's number: $N=6.02 \times 10^{23}$

2 Calculate the volume of a solution of hydrochloric acid 10 M we need to take (in mL) in order to prepare 600 mL of a solution 0.5 M by dilution.

Atomic weights: Cl=35.5; H=1

3 When nitrogen and hydrogen react with each other ammonia is formed (synthesis). In a tank we have 30 g of hydrogen and 12 g of nitrogen.

- a) determine which is the limiting reactant
- b) how much ammonia is present after the reaction (in moles and grams)
- c) how much reactant is in excess (in moles)

Atomic weights: N=14; H=1

4 Calculate the amount of methane (in grams and moles) needed to be consumed in a combustion reaction if we want to get 15 L of carbon dioxide at 2.5 atm and 17°C.

Atomic weights: O=16; H=1; C=12

$$R = 0.082 \frac{\text{atm.L}}{\text{K.mol}}$$