

Exam: CHEMICAL CALCULUS

1. Batxilergoa

Name:

Group:

1 A solution of calcium hydroxide has a volume of 420 mL and contains 20 percent of Ca(OH)_2 by mass. The density of this solution is 1.12 g/mL. Calculate:

- a) the concentration in mol/L and g/L
- b) the amount of solute in grams and moles
- c) the number of moles of Ca^{2+} and OH^- ions we have in the solution

Atomic weights: Ca=40; O=16; H=1

2 Calculate the volume of water we need to add to a solution of 0.4 L and 8 M in order to get a solution 3.2 M.

3 Magnesium and nitric acid (HNO_3) react to form magnesium nitrate and hydrogen.

If the purity of a sample of magnesium is 75 % and we have 350 g of that sample and 400 mL of a solution of nitric acid (40% of concentration and density 1.28 g/mL)

- a) determine which is the limiting reactant
- b) how much magnesium nitrate is formed (in moles and grams)
- c) how much reactant is in excess (in grams)
- d) the volume of hydrogen formed at 4 atm and 27 °C

Atomic weights: N=14; H=1; O=16; Mg=24

R=0.082 atm.L/K.mol

4 Calculate the amount of carbon dioxide (in grams, moles and molecules) formed when 120 g of butane (C_4H_{10}) are burned.

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