SBC 3

Q1 A human patient suffering from a duodenal ulcer may show a concentration of HCl of 80×10^{-3} molar in gastric juice. If his stomach receives 3 l of gastric juice per day, how much medicine (antacid syrup) containing 2.6 g of $Al(OH)_3$ per 100 ml must he consumes per day to neutralize the acid?

(a) 27 ml
(b) 80 ml
(c) 240 ml
(d) 120 ml

Q2 The empirical formula of a compound is CH_2O. If 0.0833 moles of the compound contains 1.0 g of hydrogen, its molecular formula should be

(a) $C_6H_{12}O_6$ (b) $C_5H_{10}O_5$
(c) $C_4H_8O_4$ (d) $C_3H_6O_3$

Q3 A metal oxide has the formula M_2O_3. It can be reduced by hydrogen to give free metal and water. 0.1596 g of the metal oxide required 6 mg of hydrogen for complete reduction. The atomic mass of the metal is

(a) 111.60
(b) 159.60
(c) 79.80
(d) 55.80

Q4 A quantity of 500 g of a urea solution of mole fraction 0.2 is diluted to 1500 g. The mole fraction of solute in the diluted solution is

(a) 0.05
(b) 0.067
(c) 0.6
(d) 0.1

Q5 A given sample of pure iron gains 10% of its weight on partially rusting to form Fe_2O_3. If the fraction of the iron converted to Fe_2O_3 is 'x', then the value of 30 times 'x' is (Fe = 56)

Q6 An impure sample of iron pyrite contains 28% iron, the impurity being silica. If 100 g of the sample is roasted to oxidize all the FeS_2 to Fe_2O_3, what will be the mass of the roasted sample, in g? (Fe = 56)

A quantity of 1.5 g of brass containing Cu and Zn reacts with 3 M-HNO_3 solution, the following reactions (unbalanced) take place:

$$Cu(s) + HNO_3(aq) \rightarrow Cu^{2+}(aq) + NO_2(g) + H_2O(l)$$

$$Zn(s) + H^+(aq) + NO_3^-(aq) \rightarrow NH_4^+(aq) + Zn^{2+}(aq) + H_2O(l)$$

The liberated $NO_2(g)$ was found to be 1.04 l at 25°C and 1 atm.

Q7 What is the percentage of copper in brass?
(a) 80% (b) 90%
(c) 85% (d) 10%

Q8 How many millilitres of 3 M-HNO_3 will be required for complete reaction with brass?
(a) 9.56 ml (b) 14.34 ml
(c) 6.37 ml (d) 19.12 ml

Q9 How many grams of ammonium nitrate will be formed in the reaction?
(a) 0.046 g
(b) 0.183 g
(c) 0.092 g
(d) 0.55 g

Crude calcium carbide is made in an electric furnace by the reaction:

$$CaO + 3C \rightarrow CaC_2 + CO\uparrow$$

The product contains 80% CaC_2 and 20% unreacted CaO.

Q10 How much CaO is to be added to the furnace charge for each 1280 kg of pure CaC_2 produced?
(a) 1120 kg (b) 1440 kg
(c) 1152 kg (d) 1344 kg

Q11 How much CaO is to be added to the furnace charge for each 1280 kg of crude product?
(a) 1120 kg (b) 1440 kg
(c) 1152 kg (d) 1344 kg

Q12 What will be the volume of CO gas evolved, measured at 0°C and 1 atm, when 1280 kg of crude product is formed?
(a) 448 m^3
(b) 358.4 m^3
(c) 537.6 m^3
(d) 89.6 m^3