CHEMISTRY – Entrance examination sample test

1	The density of aluminium is 2.70 g/cm^3. Express this value in units kg/m^3. A) 0.27 kg/m^3 B) 2.7 kg/m^3 C) 27 kg/m^3 D) 2.7 × 10^3 kg/m^3	
2	**Find the correct statement:** A) Proton and neutron have the same charge. B) Electron and proton have the same mass. C) Proton and neutron have the same mass. D) Electron and neutron have opposite charges.	
3	**Identify the weak base:** A) 1% NaOH B) 0.1 mol/l KOH C) 1% NH_3 D) 2% $Ca(OH)_2$	
4	**Assign oxidation states to all atoms in $KMnO_4$:** A) K: +3 ; Mn +5; O: -2 B) K: -1 ; Mn -7; O: +2 C) K: +4 ; Mn +4; O: -2 D) K: +1 ; Mn +7; O: -2	
5	**$CH_3(CH_2)_7CH=CH(CH_2)_7COOH$ is formula of:** A) palmitic acid B) stearic acid C) arachidonic acid D) oleic acid.	
6	**Which one of the following pairs is not properly matched:** A) maltose – disaccharide B) sucrose - monosaccharide C) fructose – monosaccharide D) glycogen - polysaccharide	
7	**Write balanced equation for the following process: hydrogen sulfide burns in air to produce sulfur dioxide and water:**	
8	**Chloroform is a liquid that was used as a surgical anesthetic. If the density of chlorophorm is 1.49 g/ml, what is the volume of 25 g of chloroform?** A) 16.5 ml B) 37.25 ml C) 17 ml D) 37 ml	
9	**What is the chemical formula for the compound sodium iodate?** A) NaI B) $NaIO_3$ C) Na_2I D) NaIO	
10	**How many atoms of hydrogen are in 1 mole of water (H_2O)?** A) 1.2 x 10^{25} atoms of hydrogen B) 1.20 x 10^{24} atoms of hydrogen C) 1.2 x 10^{26} atoms of hydrogen D) 1.2 x 10^{23} atoms of hydrogen	
11	**What is the molarity of a solution containing 72 grams of HCl in enough water to make 500 mL of solution?** A) 8 B) 4.8 C) 2.4 D) 4	
12	**The ionic compound containing Fe^{3+} and SO_4^{2-} would have the formula:** A) $FeSO_4$ B) Fe_2SO_4 C) $Fe_2(SO_4)_3$ D) $Fe_3(SO_4)_2$	
13	**Balance the following equation:** __ KOH + __ H_3PO_4 → __ K_3PO_4 + __ H_2O	
14	**Which is the correct name of a compound with formula H_3PO_4:** A) Phosphorous acid B) Phosphor (III) acid C) Phosphoric acid D) Sulphurous acid	
15	**Optically active molecules which rotate plane-polarized light in a counterclockwise direction are said to be:** A) levorotary B) of R configuration C) dextrorotary D) of S configuration	
16	**What is the name of the following compound?** A) pyridine B) pyrimidin C) pyrrole D) piperdine	

17	**Name the following compounds:** A) $CH_3CH_2CH_2NH_2$ .... B) $CH_3CH_2NHCH_2CH_3$ ....
18	**Calculate the pH of 0.1 mol/l HCl:**
19	 **Give the name of the following compound:** $CH_3 – CHNH_2 – COOH$ ....
20	**Give the structural formula for methyl propyl ether:**

In calculations, you may use these approximations of basic constants (select those you need):

Atomic mass unit	1.66×10^{-27} kg	Relative atomic mass:	
Avogadro constant	6×10^{23}	Oxygen	16
Elementary charge	1.6×10^{-19} C	Hydrogen	1
Faraday constant	9.65×10^4 C mol^{-1}	Chlorine	35
Gas constant	8.3 J K^{-1} mol^{-1}	Sodium	23
Mass of electron	9.1×10^{-31} kg	Potassium	39
Molar volume of gases	22.4 l	Carbon	12

Solutions

1   D
2   C
3   C
4   D
5   D
6   B
7   $2 H_2S + 3 O_2 \rightarrow 2 H_2O + 2 SO_2$
8   C
9   B
10   B
11   D
12   C
13   $3 KOH + \_\_ H_3PO_4 \rightarrow \_\_ K_3PO_4 + 3H_2O$
14   C
15   A
16   C
17   aminopropane, propylamine; diethylamine
18   1
19   alanine, aminopropanoic acid
20   $CH_3 –O–CH_2 –CH_2 –CH_3$