

- 1) What is the formula of the compound whose name is iron (III) dihydrogenarsenate?
a) $\text{Fe}(\text{H}_2\text{AsO}_3)_3$ b) FeH_2AsO_4 c) $\text{Fe}(\text{H}_2\text{AsO}_4)_3$ d) $\text{Fe}(\text{H}_2\text{AsO}_4)_2$ e) no answer is correct
- 2) How many atoms of sulfur are contained in 62 g of iron (III) sulfide? $A_r(\text{S})=32$, $A_r(\text{Fe})=56$
a) 5.4×10^{23} b) 1.8×10^{23} c) 1.3×10^{22} d) 1.3×10^{24} e) no answer is correct
- 3) Calculate the volume of hydrogen that is released in a reaction of 120.0 g of sodium with water ($A_r(\text{Na}) = 23$; $A_r(\text{O}) = 16$; $A_r(\text{H}) = 1$) (consider the standard conditions and properties of an ideal gas):
a) 116.8 dm^3 b) 29.2 dm^3 c) 4.20 dm^3 d) 58.4 dm^3 e) no answer is correct
- 4) What is the mass of one atom of zirconium? ($A_r(\text{Zr}) = 91$).
a) $5.81 \times 10^{-22} \text{ g}$ b) $1.51 \times 10^{-22} \text{ g}$ c) $5.81 \times 10^{-22} \text{ kg}$ d) $2.66 \times 10^{-22} \text{ g}$ e) no answer is correct
- 5) What element is represented by the following electron configuration? $[\text{Ne}] 3s^2p^5$
a) As b) Br c) P d) Cl
e) no answer is correct
- 6) What is the mass fraction of salt in a solution, provided that 500 cm^3 of the solution contains 120 g of the salt? The solution density is $1200 \text{ g}\cdot\text{dm}^{-3}$.
a) 0.288 b) 0.167 c) 0.200 d) 0.240
e) no answer is correct
- 7) How many elementary particles (protons, neutrons and electrons) are in an ion ${}^{75}_{33}\text{As}^{3-}$?
a) 108 b) 78 c) 111 d) 105
e) no answer is correct
- 8) Select an ionic compound:
a) Na_2O b) SiO_2 c) N_2O_3 d) CO_2 e) no answer is correct
- 9) You are asked to prepare a 15% solution of H_2SO_4 from 1.5 kg of the 20% solution. What amount of water should you add?
a) 0.75 kg b) 2.0 kg c) 1.0 kg d) 0.5 kg
e) no answer is correct
- 10) What volume of 2 M H_2SO_4 contains 40 mmol H_2SO_4 ?
a) 50 cm^3 b) 20 cm^3 c) 80 cm^3 d) 40 cm^3 e) no answer is correct

11) What is the molar concentration of a KClO_3 solution if 2 g of KClO_3 is dissolved in 200 cm^3 ($M_r = 122.6$)?

- a) 81.6 mmol/dm^3 b) 8.2 mmol/dm^3 c) 16.3 mmol/dm^3 d) 10.0 mmol/dm^3
e) no answer is correct

12) Calculate the mass of NaCl after evaporating 250 cm^3 of its 0.5 M solution ($M_r = 58.5$):

- a) 29.2 g b) 73.1 g c) 7.31 g d) 14.6 g e) no answer is correct

13) Calculate the volume of 0.2 M HCl needed for neutralization of 0.404 g of KOH ($M_r = 56.1$):

- a) 11.3 cm^3 b) 18.0 cm^3 c) 36.0 cm^3 d) 72.0 cm^3 e) no answer is correct

14) To neutralize a 20 mL sample of a 0.2 mol/L sulfuric acid solution, there is a need of using

- a) 25 cm^3 of 0.40 M sodium hydroxide b) 20 cm^3 of 0.25 M sodium hydroxide
c) 40 cm^3 of 0.10 M sodium hydroxide d) 40 cm^3 of 0.20 M sodium hydroxide
e) no answer is correct

15) What is the concentration of H_3O^+ ions in a solution of KOH with $\text{pH} = 11.0$?

- a) $1.00 \times 10^{-3} \text{ M}$ b) $1.00 \times 10^{-7} \text{ M}$ c) 7.00 M d) $1.00 \times 10^{-11} \text{ M}$ e) no answer is correct

16) Hydrochloric acid, $c = 0.01 \text{ mol.dm}^{-3}$, was diluted by adding the same volume of water. What is the pH of diluted acid?

- a) 1.70 b) 2.50 c) 2.30 d) 4.00 e) no answer is correct

17) We have a 0.001 M solution of $\text{Ca}(\text{OH})_2$ at 25° C . What is the pH of the solution?

- a) 11.0 b) 11.3 c) 3.00 d) 2.3 e) no answer is correct

18) Find a strong acid among the following compounds?

- a) H_2S b) HCOOH c) HF d) HNO_3 e) no answer is correct

19) Which substance would provide an alkaline aqueous solution?

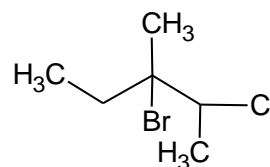
- a) $\text{C}_6\text{H}_5\text{OH}$ b) Na_2SO_4 c) $(\text{NH}_4)_2\text{SO}_4$ d) NaBr e) no answer is correct

20) Select the redox reaction:

- a) $\text{KCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{KNO}_3$ b) $\text{CaCl}_2 \rightarrow \text{Ca}^{2+} + 2 \text{Cl}^-$ c) $\text{Ba} + \text{Cl}_2 \rightarrow \text{BaCl}_2$
d) $\text{NaOH} + \text{HNO}_3 \rightarrow \text{H}_2\text{O} + \text{NaNO}_3$ e) no answer is correct

21) Select the name for the given compound

- a) 1-brom-2-chlor-isobutane b) 2-brom-3-chlor-2-ethylbutane
c) 3-brom-4-chlor-4,4-dimethylbutane d) 3-brom-2-chlor-3-methylpentane
e) no answer is correct



22) Find the isomer of cyclohexene:

- a) hexa-2,4-diene b) 1,3-dimethylcyclobutane c) 2-methylpent-1-ene
d) methylcyclopentane e) no answer is correct

23) Find cis-trans isomers:

- a) hexene + cyclohexane b) vinylalcohol + acetaldehyde c) fumaric acid + maleinic acid
d) phthalic acid + terephthalic acid

24) Find the compound that contains a primary alcohol group:

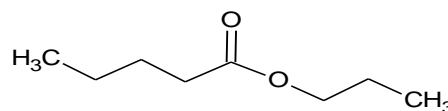
- a) pentane-2-ol b) 3-methyl-pentane-3-ol c) glycerol d) phenol e) no answer is correct

25) Select the compound that will be formed by dehydrogenation of benzaldehyde:

- a) cyclohexanol b) toluene c) phenol d) benzene e) no answer is correct

26) The following compound was formed by a reaction of:

- a) pentanoic acid and propanol b) two molecules of butanol
c) pentanol and propanoic acid d) propan and pentanoic acid
e) no answer is correct



27) Find the product of benzene-1,4-diol dehydrogenation:

- a) hydroquinone b) 1,4-benzenedicarboxylic acid c) 1,4-xylene d) 1,4-benzoquinone
e) no answer is correct

28) Determine the name of $(\text{CH}_3)_3\text{N}$:

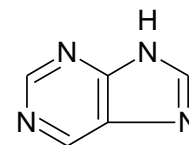
- a) trimethylnitride b) trimethylamine c) trimethylnitrile d) trimethylazide
e) no answer is correct

29) Which acid is not dicarboxylic?

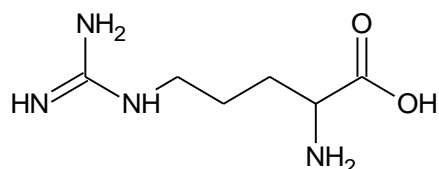
- a) malonic b) succinic c) lactic d) oxalic e) all of them are dicarboxylic

30) Select the name for the heterocycle depicted:

- a) imidazole b) pyrrole c) purine d) indole e) no answer is correct



31) Give the correct common name of the standard amino acid whose structural formula is:



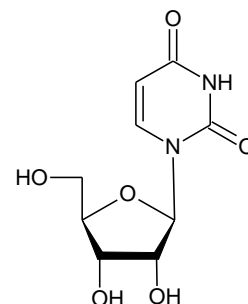
- a) arginine b) phenylalanine c) proline
d) lysine e) no answer is correct

32) Select the dicarboxylic amino acid:

- a) asparagine b) serine c) histidine d) leucine e) no answer is correct

33) What is the name of the following structure?

- a) deoxythymidine b) cytosine c) cytidine d) uridine
e) no answer is correct



34) Select the common name for a *cis,cis-9,12-octadecadienoic acid*:

- a) linoleic acid b) oleic acid c) palmitic acid d) stearic acid
e) no answer is correct

35) Soaps are:

- a) esters of fatty acids and glycerol b) products of a triacylglycerol hydrolysis in alkaline medium
c) mixtures of fatty acids and glycerol d) products of glycerol saponification
e) no answer is correct

36) Select the correct answer about thiamine

- a) it is a purine base b) it is a pyrimidine base c) it is a pyrimidine nucleotide
d) it is a vitamin B₁ e) no answer is correct

37) Select the corresponding pair of enzyme and its substrate

- a) starch – pepsin b) proteins – trypsin c) triacylglycerol – amylase d) cholesterol – lipase
e) no answer is correct

38) Which of the following features is typical for the t-RNA?

- a) anticodon b) codon c) peptide bond d) enzyme activity e) no answer is correct

39) α -D-glucopyranose and β -D-glucopyranose are

- a) epimers b) keto-aldose isomers c) optical isomers d) anomers e) no answer is correct

40) Which of the following molecules is not a polysaccharide?

- a) amylose b) maltose c) cellulose d) glycogen e) no answer is correct