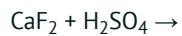
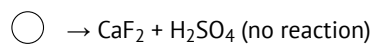
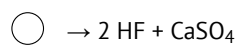
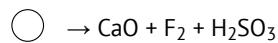
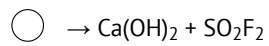


Question 1

Select the correct products of the following reaction:



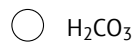
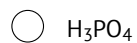
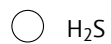
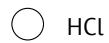
Select one:



Question 2

Select a strong acid.

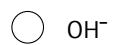
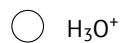
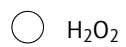
Select one:



Question 3

Select the conjugate acid of H_2O .

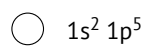
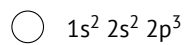
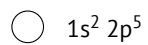
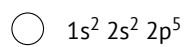
Select one:



Question 4

Select the correct electron configuration for nitrogen (N).

Select one:



Question 5

Select the true statement for the following reaction at the equilibrium state:



Select one:

- The reaction will be stimulated by decrease in the concentration of O_2 .
 - The reaction will be stimulated by increase in the concentration of NO .
 - The reaction will be stimulated by decrease in the pressure.
 - Changes in the pressure will not affect the reaction.
 - The reaction will be stimulated by increase in the pressure.
-

Question 6

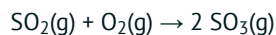
Select the atom, which possesses the same electron configuration as oxide anion (O^{2-}).

Select one:

- F
- C
- S
- Ne

Question 7

Select the true statement for the following exothermic reaction at the equilibrium state:



Select one:

- The reaction will be stimulated by decrease in the concentration of O_2 .
 - The decrease in temperature will stimulate production of SO_3 .
 - The reaction will be stimulated by increase in the concentration of SO_3 .
 - The increase in temperature will stimulate production of SO_3 .
 - Changes in temperature will not affect the reaction.
-

Question 8

Which of the following reactions is an oxidation-reduction reaction?

Select one:

- $\text{NaNO}_3 + \text{NaHSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{HNO}_3$
- $2 \text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + 2 \text{H}_2\text{O}$
- $\text{NaNO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HNO}_3$
- $8 \text{HNO}_3 + 3 \text{Cu} \rightarrow 3 \text{Cu}(\text{NO}_3)_2 + 4 \text{H}_2\text{O} + 2 \text{NO}$

Question 9

2-Methylpropan-2-ol is classified as

Select one:

- a tertiary alcohol
- a ketone
- a secondary alcohol
- an aldehyde
- a primary alcohol

Question 10

Products of reaction between ethanol and hydrogen chloride are

Select one:

- Chloroethane and water
- Hydrogen chloride and water
- Carbon dioxide and water
- Carbon and water
- Chlorine and water

Question 11

Reduction of ketone produces

Select one:

- a. Secondary alcohol
- b. Tertiary alcohol
- c. Carboxylic acid
- d. Aldehyde
- e. Primary alcohol

Question 12

The first step of substitution reaction of alkanes is.....

Select one:

- a. termination, formation of the radical
 - b. propagation, radical attacks the alkane
 - c. initiation, formation of radical
 - d. propagation, formation of the radical
 - e. initiation, takes place in the darkness
-

Question 13

The addition polymerisation is characterised by

Select one:

- a. the polymer being completely dissolved at the end of the reaction.
- b. the polymer being the only product of the reaction.
- c. the product of the reaction is polymer and water.
- d. the product is always colourless.
- e. an unpleasant gas is produced during this reaction.

Question 14

During the reaction of bromoethane with cyanide ions in ethanol, which one of the following is formed?

Select one:

- a. ethanecyanide
 - b. propanenitrile
 - c. propanecyanide
 - d. ethanenitrile
 - e. ethane and hydrogenbromide
-

Question 15

Alkylation of benzene is

Select one:

- a. Nucleophilic substitution
- b. Electrophilic substitution
- c. Electrophilic addition
- d. Elimination
- e. Nucleophilic addition

Question 16

When esters are refluxed with an alkali, the product(s) of this reaction is/are

Select one:

- a. Ester and water
- b. Alcohol and water
- c. Alcohol and salts of carboxylic acid
- d. Ester and carboxylic acid
- e. Ester and alcohol

Question 17

The presence of H^+ (aq) ions in solution of carboxylic acid means that they undergo all the usual reactions of acid. When an acid reacts with carbonates, are formed.

Select one:

- a. Salts and water
 - b. Salts, water and carbon dioxide
 - c. Salts and carbon dioxide and hydrogen
 - d. Salts and hydrogen
 - e. Salts and carbon dioxide
-

Question 18

Amines contains nitrogen atom with a lone pair of electrons that is available to attack the carbonyl carbon atom in acyl chloride. The reaction is vigorous and organic product of this reaction is

Select one:

- a. amine
- b. amide
- c. carboxylic acid and amine
- d. alcohol and nitrogen
- e. carboxylic acid and ammonia

Question 19

Functional group isomers

Select one:

- a. are compounds with the same structural formula but different molecular formula.
- b. are compounds with a different position of the functional group.
- c. contain a chiral centre.
- d. differ in the structure of their carbon skeleton.
- e. have different functional group present.

Question 20

Optical isomers

Select one:

- a. contain a chiral centre.
- b. have no free rotation.
- c. have different functional group present.
- d. differ in the structure of their carbon skeleton.
- e. are compounds with a different position of the functional group.

Question 21

Select the FALSE statement about amines.

Select one:

- a. By realising electrons to the N atom of the ethyl group of ethylamine makes the lone electron pair more readily available to bond with H^+ ion than it is in ammonia.
 - b. Ethylamine is a stronger base than ammonia.
 - c. Ammonia and the amines have different strengths as bases.
 - d. The strongest base of the following (ammonia, ethylamine and phenylamine) is ammonia.
 - e. Phenylamine is a weaker base than ammonia.
-

Question 22

The functional group in the following compound CH_3NH_2 is

Select one:

- a. nitrile
- b. amine
- c. ester
- d. amide
- e. alcohol

Question 23

The functional group of the following compound $\text{CH}_3\text{COOC}_2\text{H}_5$ is

Select one:

- a. ester
 - b. alcohol
 - c. aldehyde
 - d. anhydride
 - e. ketone
-

Question 24

Classify this reaction, choosing from the types of reactions below



Select one:

- a. Oxidation
- b. Elimination
- c. Addition
- d. Hydrolysis
- e. Substitution

Question 25

Characterize alanine in the environment that has pH lower than the isoelectric point of alanine

Select one:

- a. behaves as an acid
 - b. has an overall zero charge
 - c. it moves towards the anode in the electric field
 - d. it moves towards the cathode in electric field
 - e. loses its hydroxyl group
-

Question 26

Which one of the following contains indole moiety?

Select one:

- a. tryptophane
- b. ethanolamine
- c. acetaldehyde
- d. histidine
- e. vinylalcohol

Question 27

From the following select the INCORRECT statement on linoleic acid

Select one:

- a. is a hydrophobic molecule
 - b. it is an essential acid
 - c. complete hydrogenation of linoleic acid results in palmitic acid formation
 - d. contains two double bonds in *cis* formation
 - e. is part of plant oils
-

Question 28

Gangliosides are:

Select one:

- a. steroids
- b. triacylglycerols
- c. polysaccharides
- d. lipoproteins
- e. glycolipids

Question 29

Proteins are effective buffers because they contain:

Select one:

- a. a large number of hydrogen bonds in α -helices
 - b. N-terminal and C-terminal residues that can donate and accept protons
 - c. peptide bonds that readily hydrolyze, consuming hydrogen and hydroxyl ions
 - d. amino acid residues with different pKs
 - e. a large number of amino acids
-

Question 30

From the following select the INCORRECT statement on ATP

Select one:

- a. xanthine and phosphoric acid are formed during its hydrolysis
- b. contains N-glycosidic, ester and anhydride bond
- c. is energy source within a cell
- d. contains macroergic bond
- e. is formed in respiratory chain

Question 31

Transaminases catalyze the transfer of

Select one:

- a. ammonia
 - b. nitrogen
 - c. OH group
 - d. NO₂ group
 - e. NH₂ group
-

Question 32

From the following select the molecule which causes lowering of blood glucose concentration:

Select one:

- a. glucagon
- b. aldosterone
- c. insulin
- d. parathyrine
- e. adrenaline

Question 33

Starch contains:

Select one:

- a. amylopectin
 - b. galactose
 - c. fructose
 - d. dextran
 - e. amylase
-

Question 34

From the following select a molecule that DOES NOT belong among polysaccharides:

Select one:

- a. agar
- b. cellulose
- c. amylase
- d. amylopectin
- e. glycogen

Question 35

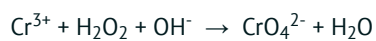
What is the concentration of $\text{Ca}(\text{OH})_2$ with $\text{pH} = 10$.

Select one:

- a. 0.00005
 - b. 0.1
 - c. 0.0005
 - d. 0.0004
 - e. 0.0001
-

Question 36

From the following select the reaction with correct stoichiometric coefficients. The reaction is:



Select one:

- a. $2\text{Cr}^{3+} + 2\text{H}_2\text{O}_2 + 12\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + 8\text{H}_2\text{O}$
- b. $2\text{Cr}^{3+} + 4\text{H}_2\text{O}_2 + 8\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + 8\text{H}_2\text{O}$
- c. $2\text{Cr}^{3+} + 3\text{H}_2\text{O}_2 + 10\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + 8\text{H}_2\text{O}$
- d. $2\text{Cr}^{3+} + 5\text{H}_2\text{O}_2 + 4\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + 7\text{H}_2\text{O}$
- e. $2\text{Cr}^{3+} + \text{H}_2\text{O}_2 + 6\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + 6\text{H}_2\text{O}$

Question 37

Calculate the content of carbon, in mass percentage, in lactic acid $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$.

$M(\text{C}) = 12.0 \text{ g/mol}$, $M(\text{O}) = 16.0 \text{ g/mol}$, $M(\text{H}) = 1.0 \text{ g/mol}$.

Select one:

- 13.33%
 - 40.00%
 - 53.33%
 - 26.67%
-

Question 38

Sample weighing 800 mg contains glucose and 20% water, it is dissolved in 145 cm^3 of solution. Calculate the molar concentration of glucose in mmol/dm^3 . $M_r(\text{glucose}) = 180$, density of glucose solution is 1 g/cm^3 .

Select one:

- a. 30.6 mmol/dm^3
- b. 306 mmol/dm^3
- c. 2.45 mmol/dm^3
- d. 3.06 mmol/dm^3
- e. 24.5 mmol/dm^3
- f. 245 mmol/dm^3

Question 39

Calculate the pH of 0.2M H_2SO_4 .

Select one:

- a. 0.2
 - b. 0.1
 - c. 0.3
 - d. 0.5
 - e. 0.4
-

Question 40

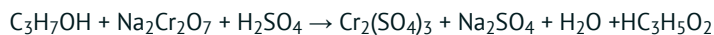
Calculate pOH of 0.1 M $\text{Ca}(\text{OH})_2$.

Select one:

- a. 0.7
- b. 13
- c. 1
- d. 12
- e. 13.3

Question 41

Balance the following molecular equation by the oxidation-number-change method.



Select one:

- a. $3\text{C}_3\text{H}_7\text{OH} + 3\text{Na}_2\text{Cr}_2\text{O}_7 + 12\text{H}_2\text{SO}_4 \rightarrow 3\text{Cr}_2(\text{SO}_4)_3 + 2\text{Na}_2\text{SO}_4 + 11\text{H}_2\text{O} + 3\text{HC}_3\text{H}_5\text{O}_2$
- b. $3\text{C}_3\text{H}_7\text{OH} + 2\text{Na}_2\text{Cr}_2\text{O}_7 + 6\text{H}_2\text{SO}_4 \rightarrow 2\text{Cr}_2(\text{SO}_4)_3 + 2\text{Na}_2\text{SO}_4 + 9\text{H}_2\text{O} + 3\text{HC}_3\text{H}_5\text{O}_2$
- c. $3\text{C}_3\text{H}_7\text{OH} + 2\text{Na}_2\text{Cr}_2\text{O}_7 + 10\text{H}_2\text{SO}_4 \rightarrow 3\text{Cr}_2(\text{SO}_4)_3 + 2\text{Na}_2\text{SO}_4 + 11\text{H}_2\text{O} + 4\text{HC}_3\text{H}_5\text{O}_2$
- d. $2\text{C}_3\text{H}_7\text{OH} + \text{Na}_2\text{Cr}_2\text{O}_7 + 4\text{H}_2\text{SO}_4 \rightarrow \text{Cr}_2(\text{SO}_4)_3 + \text{Na}_2\text{SO}_4 + 7\text{H}_2\text{O} + 3\text{HC}_3\text{H}_5\text{O}_2$
- e. $3\text{C}_3\text{H}_7\text{OH} + 2\text{Na}_2\text{Cr}_2\text{O}_7 + 8\text{H}_2\text{SO}_4 \rightarrow 2\text{Cr}_2(\text{SO}_4)_3 + 2\text{Na}_2\text{SO}_4 + 11\text{H}_2\text{O} + 3\text{HC}_3\text{H}_5\text{O}_2$
-

Question 42

How many grams of glucose are needed to prepare 800 mL of 500 mmol/L glucose solution?

$M(\text{glucose}) = 180.16 \text{ g/mol}$.

Select one:

- 144.1 g
- 36.0 g
- 90.1 g
- 72.1 g

Correct answers:

1 C	11 A	21 D	31 E	41 E
2 A	12 C	22 B	32 C	42 D
3 B	13 B	23 A	33 A	
4 C	14 B	24 E	34 C	
5 C	15 B	25 D	35 A	
6 D	16 C	26 A	36 C	
7 B	17 B	27 C	37 B	
8 D	18 B	28 E	38 E	
9 A	19 E	29 D	39 E	
10 A	20 A	30 A	40 A	