

1 - The impact of household cleaners on the environment is minimized because these products are formulated:

- a) **To work with water and end up in wastewater treatment plants**
- b) Free of chemicals
- c) With natural ingredients only
- d) To change into environmentally friendly ingredients immediately after use

2 - A cationic surfactant is:

- a) **Positively charged**
- b) Negatively charged
- c) Both positively and negatively charged
- d) None of the above

3 - In the process of hair coloring, the desired color is obtained by:

- a) Oxidation of the natural hair pigment
- b) **Application of an organic synthetic dye**
- c) Setting the hair in the desired shape
- d) Treating the hair with a reducing agent

4 - Fragrances in perfumes are generally experienced in three stages or notes because of the:

- a) **Volatility of the ingredients**
- b) Density of the ingredients
- c) Price of the ingredients
- d) Color of the ingredients

5 - Sunscreen products contain chemicals to absorb:

- a) Microwaves
- b) Vibration
- c) Infrared radiation
- d) **UV Radiation**

6 - The effective chemical ingredients in deodorants are:

- a) **Antibacterial agents and perfumes**
- b) Water and table salt
- c) Pigments
- d) Dyes

7 - Surfactants are effective in:

- a) Reducing the density of water
- b) Increasing the surface tension of water
- c) **Decreasing the surface tension of water molecules**
- d) Heating water molecules

8 - Which ions are responsible for the hardness of water?

- a) Na^+ and K^+
- b) F^- and Cl^-
- c) Al^{3+} and Br^-
- d) **None of the above**

9 - In the cleaning process the soap (or detergent) provides:

- a) Mechanical interaction
- b) Thermal interaction
- c) **Chemical interaction**
- d) None of the above

10 - Laundry detergents are formulated by mixing many ingredients because they perform diverse functions.

- a) **True**
- b) False

11 - Long chain and cyclic structures are common for organic compounds because carbon can form:

- a) Ionic bonds with other carbon atoms
- b) **Covalent bonds with other carbon atoms**

- c) No bonds with other carbon atoms
- d) None of the above

12 - The compound with the formula CH_3OH is an:

- a) **Alcohol**
- b) Ether
- c) Amine
- d) Ester

13 - The compound with the formula $\text{C}_4\text{H}_9\text{OH}$ is an:

- a) **Alcohol**
- b) Ether
- c) Amine
- d) Ester

14 - How many hydrogen atoms are there in a compound with the formula $\text{CH}_3(\text{CH}_2)_3\text{OH}$?

- a) 4
- b) 9
- c) 6
- d) **10**

15 - How many hydrogen atoms are there in a compound with the formula $\text{CH}_3(\text{CH}_2)_3\text{NH}_2$?

- a) 4
- b) 9
- c) **11**
- d) 8

16 - The number of hydrogen atoms in a cyclohexane ring is:

- a) 6
- b) 9
- c) **12**
- d) None of the above

17 - The number of hydrogen atoms in a benzene ring is:

- a) **6**
- b) 9
- c) 12
- d) None of the above

1 - Which of the following is a bacterial infection?

- a) Cancer
- b) AIDS
- c) Depression
- d) **None of the above**

19 - Which of the following is a bacterial infection?

- a) Cancer
- b) AIDS
- c) Depression
- d) **Tuberculosis**

20 - Tetracyclines are used as:

- a) Anticancer drugs
- b) Antiviral drugs
- c) **Antibiotics**
- d) None of the above

21 - Cephalosporins are used as:

- a) Antiviral drugs
- b) Antibiotics**
- c) Anti-inflammatory drugs
- d) None of the above

22 - Topoisomerase inhibitors are used for the treatment of:

- a) AIDS
- b) Cancer**
- c) Influenza
- d) Arthritis

23 - Chemotherapy involves treatment of cancer using:

- a) Chemicals**
- b) Hypnotherapy
- c) Surgery
- d) None of the above

24 - The treatment of AIDS involves the use of

- a) Antibacterial agents
- b) OTCs
- c) Antiviral agents**
- d) Antidepressants

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- b) OTCs
- c) Antidepressants
- d) None of the above**

26 - SSRIs are used as:

- a) Fungicide
- b) Insecticide
- c) Antidepressants**
- d) Growth hormone

27 - The treatment of depression involves the use of:

- a) Penicillins
- b) Protease inhibitors
- c) Anti-inflammatory agents
- d) SSRIs**

28 - It is believed that the effectiveness of Aspirin is due to its ability to increase the production of prostaglandins.

- a) True
- b) False**

29 - A functional group can be visualized as the chemically functioning part of the molecule.

- a) True**
- b) False

30 - Weakly acidic nature of rain is due to dissolved:

- a) CO₂ (g)**
- b) O₂ (g)
- c) O₃ (g)
- d) N₂ (g)

31 - The pH of a solution is measured to be 7.0. The solution is:

- a) Acidic
- b) Basic
- c) **Neutral**
- d) None of the above

32 - Hydroelectric is an example of a:

- a) Fossil energy source
- b) **Non-fossil energy source**
- c) No energy source
- d) Solar energy source

33 - One of the gases responsible for global warming is:

- a) CO
- b) N₂
- c) **N₂O**
- d) O₂

34 - The combined interaction of ozone/oxygen in the stratosphere with solar radiation protects us from the harmful effects of:

- a) **UV radiation**
- b) IR radiation
- c) Microwaves
- d) None of the above

35 - The pH value for a solution of sodium acetate (a basic solution) should be:

- a) **Above 7.0**
- b) Below 7.0
- c) Equal to 7.0
- d) Equal to 1.5

36 - The solubility of lead at a pH of 9.5 is higher than at a pH of 4.2.

- a) True
- b) **False**

37 - The agreement to reduce and ultimately ban the manufacture and use of CFCs goes by the name of:

- a) Kyoto protocol
- b) EC Free Trade Agreement
- c) Geneva Convention
- d) **Montreal Protocol**

38 - Energy conservation is one of the suggested ways to control global warming.

- a) False
- b) **True**

39 - The reaction of calcium carbonate with sulfuric acid generates gaseous:

- a) CO
- b) **CO₂**
- c) O₂
- d) O₃

40 - Solve the following problems and express the answers in scientific notation with the correct number of significant digits.

- a) a) 3.0×10^{-2} ml
- b) 2.5100×10 g
- c) 1.889×10 g
- d) 6.150×10^{-1} ml
- e) 1.242×10

41 - A metal block weighs 29.454 g and is 2.35 cm long, 1.34 cm wide and 1.05 cm high. Which one of these answers has the correct density? What is the name of the element?

- a) Ni 8.91 g/cm³
- b) Zn 7.14 g/cm³
- c) Ti 4.00 g/cm³
- d) Sn 7.23 g/cm³

42 - A microchip contains 5.68 mg of Si (silicon).

- a) How many moles does it contain?
- b) How many atoms are there?

43 - How many protons, neutrons and electrons are found in the following?

- a) Mg
- b) Mg²⁺
- c) Co²⁺
- d) Co
- e) Cl⁻

44 - Identify the element (whole name and abbreviation) based on the atomic number and atomic mass:

- a) Atomic number: 15, Atomic mass: 31 _____
- b) Atomic number: 53, Atomic mass: 127 _____
- c) Atomic number: 19, Atomic mass: 39 _____
- d) Atomic number: 47, Atomic mass: 108 _____
- e) Atomic number: 82, Atomic mass: 207 _____

45 - Soaps are considered water-soluble, whereas detergents are water-insoluble

- a) **False**
- b) True

46 - The term hydrophilic means water-soluble, whereas hydrophobic means water hating

- a) **False**
- b) True

47 - There are four different types of surfactants that are categorized based on the number of carbon atoms in their structure

- a) **False**
- b) True

48 - Cleaning process can be viewed as a combination of several interactions; chemical, mechanical and vibrational interactions

- a) False
- b) **True**

49 - An anionic surfactant is without charge

- a) **False**
- b) True

50 - For water to be classified as hard, it should contain (Na⁺) ions.

- a) **False**
- b) True

51 - Household soaps and detergents are classified into several types, depending on their brand name

- a) **False**
- b) True

52 - Household cleaners are considered environmentally friendly, b/c they are solely made of natural ingredients.

- a) **False**
- b) True

53 - One of the main differences between soaps and detergents is that soaps are synthetic surfactants.

- a) False
- b) True

54 - There are different types of personal care products, which are categorized according to their colour and smell.

- a) False
- b) True

55 - Hair conditioner contains amphoteric surfactant, whereas shampoo contains cationic surfactants

- a) False
- b) True

56 - There are 5 steps that are used in curling of hair

- a) False
- b) True

57 - Hair colouring involves two step, using a bleaching agent as an oxidation agent

- a) False
- b) True

58 - Sunscreen products are used to absorb X-ray radiation

- a) False
- b) True

59 - Lipsticks and mascara are examples of hair care products

- a) False
- b) True

60 - The ingredients in perfumes are blended based upon their taste

- a) False
- b) True

61 - Surfactants are only used with detergents and soaps, and are not ingredients in personal care products

- a) False
- b) True

62 - UV radiation stands for infrared radiation

- a) False
- b) True

63 - Elements can form compounds with all other elements?

- a) True
- b) False

64 - If you are traveling at a speed of 100km per hour, how long will it take to travel 340×10^3 km?

65 - Convert the following measurements:

- a) 100ml into μ l _____
- b) 0.025mg into g _____
- c) 3000m/s into km/hr _____

66 - What is the formula of calcium hydrogen carbonate also known as calcium bicarbonate?

- a) CaHCO_3
- b) Ca_2HCO_3
- c) $\text{Ca}(\text{HCO}_3)_2$

67 - A sample of your tap water contains 45 mg of NaCl (sodium chloride, also known as table salt) in a total volume of 10ml.

- a) How many moles of NaCl does it contain?
- b) How many atoms are there in this sample?
- c) Do you think this water would taste salty?

68 - Name each of the following compounds.

- | | | |
|----|----------------------------|--------------------------|
| a) | Na_2SO_4 | Sodium Sulphate |
| b) | NaHCO_3 | Sodium Bicarbonate |
| c) | $\text{Fe}(\text{NO}_3)_3$ | Ferric Nitrate |
| d) | N_2O_3 | Nitrogen Oxide |
| e) | PCl_5 | Phosphorus Pentachloride |
| f) | N_2O_5 | |

69 - What are the coefficients for the reactants and the products when the equation for the reaction:
 $\text{Ca}(\text{OH})_2 (\text{aq}) + \text{H}_2\text{SO}_4 (\text{aq}) \rightarrow \text{CaSO}_4 (\text{s}) + \text{H}_2\text{O} (\text{l})$ is balanced?

- a) 2, 2, 2, 4
- b) 1, 1, 1, 1
- c) 1, 1, 1, 2
- d) None of the above

70 - What is the mass in grams of one mole of sulfur atoms?

- a) 32.06 g
- b) 64.12 g
- c) 16.02 g
- d) 96.18 g

71 - What is the mass in grams of 6.022×10^{23} atoms of calcium?

- a) 6.022×10^{23} g
- b) 40.08 g/mol
- c) 6.022 g/mol
- d) 1.022×10^{23} g

72 - Potassium nitrate has the formula:

- a) KNO_3
- b) $\text{K}_2(\text{NO}_3)_2$
- c) $\text{K}(\text{NO}_3)_2$
- d) K_2NO_3

73 - The correct name for FeCl_3 is:

- a) Iron chloride
- b) Iron trichloride
- c) Iron (III) chloride
- d) Monoiron trichloride

74 - If 5.0 mL of a liquid has a mass of 4.90 g, its density is:

- a) 0.098 g/mL
- b) 9.8×10^{-1} g/mL
- c) 98.0×10^{-2} g mL⁻¹
- d) 9.80×10^{-1} g/mL

75 - After performing a calculation, Frank's calculator displayed the result as 5.25916. If the answer can have only three significant figures and must be expressed using scientific notation, it should be reported as:

- a) 5.25
- b) 5.25×10^0
- c) 0.525×10
- d) 5.26×10^0

76 - How many liters (expressed in scientific notation and with appropriate number of significant figures) are there in 3.00 μL ?

- a) $3.00 \times 10^{-6} \text{ L}$
- b) $30.00 \times 10^{-5} \text{ L}$
- c) $(300/1000) \text{ L}$
- d) $0.300 \times 10^6 \text{ L}$

77 - Element with an atomic number of 54 is a:

- a) Metal
- b) Non-metal
- c) Metalloid
- d) None of the above

78 - If an atom contains 8 protons and 10 electrons it is:

- a) A cation
- b) An anion
- c) An atom with no charge
- d) None of the above

79 - An object had a mass of 4.1876 g when weighed on an analytical balance. The uncertain digit in the measurement is:

- a) 7
- b) 8
- c) 5
- d) 6

80 - The final answer for the calculation, $(5.173 \times 10^5) \times (11.5 \times 10^2)$ contains:

- a) 4 significant figures
- b) 3 significant figures
- c) 1 significant figure
- d) 10^6 significant figures

81 - The volume of a room measuring 6.5 m \times 6.2 m \times 3.0 m is given by:

- a) 120.9 m^3
- b) 120.9
- c) $1.21 \times 10^2 \text{ m}^3$
- d) $1.2 \times 10^2 \text{ m}^3$

82 - The smallest volume is represented by:

- a) 1.0 L
- b) 1000 mL
- c) $1.0 \times 10^4 \mu\text{L}$
- d) $1.0 \times 10^4 \text{ cm}^3$

83 - In the Periodic Table, the halogens are in the same

- a) Group
- b) Period
- c) Section
- d) None of the above

84 - Workers have a right to:

- a) Work in a safe and healthy environment
- b) Know the processes and substances they are working with
- c) Know the potential hazards from the substances and the processes
- d) All of the above

85 - A doctor working in an area with the possibility of exposure to X-Rays is at risk of being exposed to which of the following agents?

- a) Chemical
- b) Physical**
- c) Biological
- d) None of the above

86 - The hazard posed by concentrated solutions of potassium permanganate (an oxidizing agent) is classified as:

- a) Physical
- b) Chemical**
- c) Biological
- d) Ergonomic

87 - Which of the following statements is false?

- a) Severe damage to eyes may result from excessive exposure to ultraviolet radiation
- b) Microwaves do not penetrate appreciably below the skin
- c) X-Rays are highly penetrating and damaging to tissue
- d) Radiation can be detected by human senses**

88 - According to WHMIS, the cost of effective worker training must be paid by the:

- a) Employer**
- b) Employee
- c) Supplier
- d) Regulators

89 - Chemicals causing changes in DNA are known as:

- a) Carcinogens
- b) Mutagens**
- c) Teratogens
- d) Irritants

90 - Spray painting generates fine liquid droplets suspended in air called:

- a) Paint Spray mist**
- b) Solid mist
- c) Acid mist
- d) All of the above

91 - The unit used to express exposure to vapors is:

- a) m³/L
- b) L
- c) ppm**
- d) All of the above

92 - The abbreviation WHMIS stands for:

- a) World Human Migration Institute Stand
- b) Workplace Hazardous Materials Information System**
- c) Workplace Helpful Materials Indexing System
- d) None of the above

93 - Ergonomic stresses arise as a result of optimal adjustment between the worker and the workplace.

- a) **False**
- b) True

94 - A concentration of of 15.0 ppb for a gas in air is equal to:

- a) 1.50×10^2 ppb
- b) 1.50×10^{-2} ppm
- c) 1.50×10^5 %
- d) 1.50×10^{-3} %

95 - Which of the following poses the most risk (based upon TLV-TWA values given in parentheses):

- a) **Compound A (2 ppb)**
- b) Compound B (2.5×10^4 ppb)
- c) Compound C (100 ppb)
- d) Compound D (3.0×10^{-4} %)

96 - Nitrogen is a minor component of the air we breathe.

- a) True
- b) **False**

97 - The electron pair in the O-H bond of water is more strongly attracted by the oxygen atom due to its higher:

- a) **Electronegativity**
- b) Molar mass
- c) Atomic radius
- d) None of the above

98 - Exposure to O₃ may cause:

- a) **Reduced lung function**
- b) Enhanced lung function
- c) Hair loss
- d) Memory loss

99 - NO_x represents:

- a) NO₂ only
- b) **Mixture of oxides of nitrogen**
- c) Droplets of HNO₃
- d) Particles of nitrate salts

100 - The concentration of air contaminants is determined by:

- a) Exposing humans to the contaminant
- b) **Sampling and analyzing to the contaminant**
- c) Exposing animals to the contaminant
- d) None of the above

101 - A worker is repeatedly exposed to a concentration of 2.5×10^{-4} % of a substance. If the TLV-TWA for the substance is 5.0 ppm, is it a safe work environment for the worker?

- a) **Yes**
- b) No

102 - Risk characterization integrates the exposure and effects components to estimate the risk.

- a) **True**
- b) False

103 - The presence of hydrogen bonding in water accounts for its:

- a) Taste
- b) Odor
- c) Color
- d) **None of the above**