1. A student is given only the nucleon number of an atom. What can be deduced about the structure of the atom?

   A. Number of neutrons plus protons

   B. Number of neutrons only

   C. Number of protons plus electrons

   D. Number of protons only

2. Some students wrote three statements about the bonding in a molecule of ammonia, NH_3.

   1. A nitrogen atom has three outer electrons so all outer electrons are involved in bonding.
   2. A nitrogen atom has five outer electrons so two outer electrons are not involved in bonding.
   3. A nitrogen atom shares electrons with each of three hydrogen atoms.

   Which statements about the bonding in ammonia are correct?

   A. 1 and 3

   B. 1 only

   C. 2 and 3

   D. 2 only

3. The table shows some properties of four solid elements. Which element could be graphite?

	Electrical Conductivity	Melting point /°C
A.	Good	97
B.	Good	3550
C.	Poor	113
D.	Poor	4750

4. Which statement about chlorine atoms and chloride ions is correct?

   A. They are both isotopes of chlorine.

   B. They undergo the same chemical reactions.

   C. They have the same number of protons.

   D. They have the same physical properties.

5. Four gases are listed.

1. CH_4
2. NH_3
3. CO_2
4. N_2

Same amount of each of gases 1 – 4 is allowed to diffuse.
What is the order of their rate of diffusion at room temperature and pressure?

	Slowest ⟹ Fastest			
A.	1	2	4	3
B.	2	1	3	4
C.	3	4	2	1
D.	4	1	3	2

6. An ionic compound has the formula XY, where Y is a non-metal. Which statement about XY is correct?

A. An atom of X has lost at least one electron to form a positive ion.

B. Both X and Y share a pair of electrons.

C. Element X is also a non-metal.

D. XY will not conduct electricity when liquid.

7. A lump of element X can be cut by a knife. During its reaction with water, X floats and melts. What is X?

A. Calcium

B. Copper

C. Magnesium

D. Potassium

8. Some properties which make elements different from each other are listed.

1. metallic character
2. number of electron shells in an atom
3. number of protons in an atom
4. total number of electrons in an atom

Which two properties increase across a period of the Periodic Table?

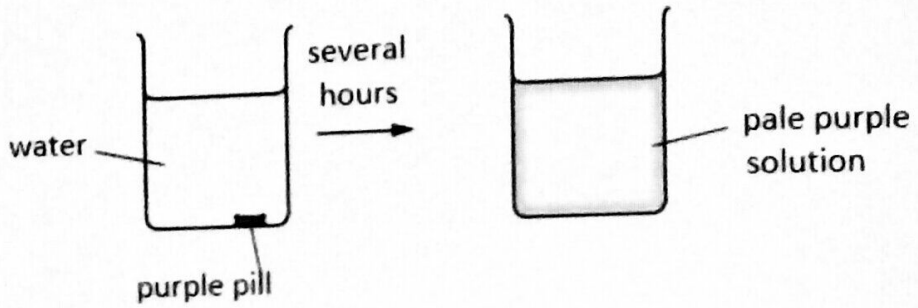
A. 1 and 2 **B.** 1 and 3 **C.** 2 and 4 **D.** 3 and 4

9. An element, Z, from Group II of the Periodic Table reacts with chlorine, an element from Group VII. What is the formula of the ionic compound formed?

A. ZCl_2 B. Z_2Cl C. Z_2Cl_7 D. Z_7Cl_2

10. A purple pill is placed in a beaker of water. The beaker is left for several hours.

The diagram shows the appearance of the water when the pill is added and several hours later



Which statement explains why this change occurs?

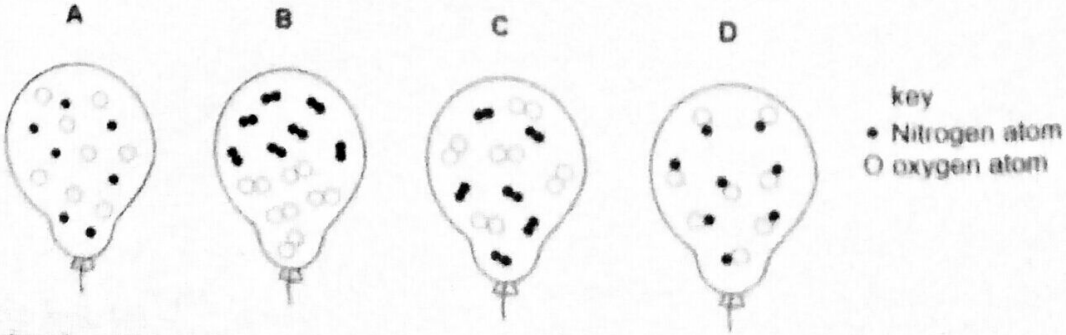
A. Diffusion occurs because the pill is coloured.

B. Diffusion occurs faster at higher temperatures.

C. Diffusion occurs from an area of high concentration to one of lower concentration.

D. Gases diffuse faster than liquids.

11. Which diagram shows the arrangement of particles inside a balloon containing a mixture of the gases nitrogen and oxygen?



12. A particle of an isotope of sulfur contains 18 neutrons and 18 electrons. What is the symbol for this particle?

A. $^{34}S_{16}^{2+}$

B. $^{34}S_{16}$

C. $^{34}S_{16}^{2-}$

D. $^{34}S_{18}$

13. When two elements react together, a compound is formed. Which statement is correct?

A. Equal masses of the elements must be used.

B. The compound shows similar chemical properties to those of the elements.

C. The elements must both be non-metals.

D. When the elements react together, ionic or covalent compounds form.

14. Which statement is correct for all ionic compounds?

A. They dissolve in water.

B. They are formed when metals share electrons with non-metals.

C. They conduct electricity in the molten state.

D. They conduct electricity in the solid state.

15. When a piece of sodium is heated in air, it reacts with oxygen to form the ionic compound sodium oxide, Na_2O. In terms of electrons, which statement correctly explains what happens when sodium reacts with oxygen?

A. An oxygen atom shares two electrons with two sodium atoms.

B. A sodium atom loses two electrons which are transferred to an oxygen atom.

C. A sodium atom shares its outer shell electron with two oxygen atoms.

D. Two sodium atoms each lose one electron which are both transferred to one oxygen atom.

16. The total number of electrons in one atom of element Q is 17 and in one atom of element R is 19. Which statement about elements Q and R is correct?

A. Q and R react together to form a covalent compound.

B. Q forms positive ions.

C. R has more outer shell electrons than Q.

D. R is more metallic than Q.

17. A gas is evolved during a reaction. Which two pieces of apparatus would enable the rate of this reaction to be measured?

A. Balance and pipette

B. Gas syringe and thermometer

C. Stopclock and gas syringe

D. Stopclock and pipette

18. How many of the molecules shown contain only one covalent bond?

Cl_2 H_2 HCl N_2 O_2

A. 2 B. 3 C. 4 D. 5

19. Which substance has a giant covalent structure and contains atoms of more than one element?

A. Diamond B. Graphite C. Methane D. Sand

20. Metals conduct electricity. The movement of which particles is responsible for this conductivity?

A. Anions B. Cations C. Electrons D. Protons

21. Which statement about sulfuric acid is correct? Sulfuric acid is used

A. as a bleach.

B. in food preservation.

C. in the manufacture of detergents.

D. in the purification of drinking water.

22. Which row shows the order of increasing pH (lowest to highest) for strong acids, strong bases, weak acids and weak bases at the same amount?

	pH ⟶			
A.	strong acid	weak acid	weak bases	strong bases
B.	strong bases	weak bases	weak acids	strong acids
C.	weak acids	strong acids	weak bases	strong bases
D.	weak bases	strong bases	strong acids	weak acids

23. The table shows the proton numbers of four elements.

Elements	Q	R	T	Z
Proton Number	9	11	17	19

Which statement is correct?

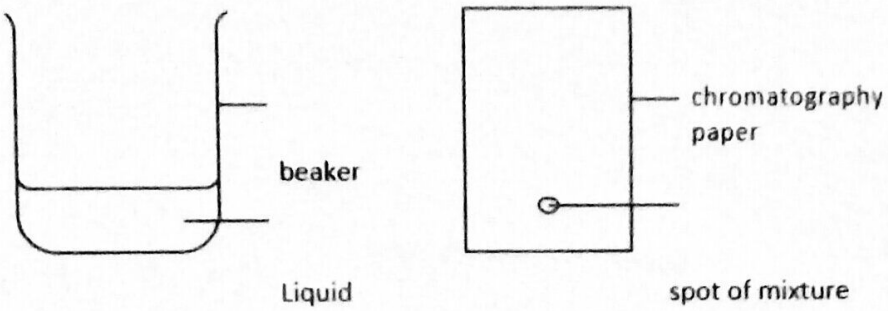
A. Q is a metal.

B. Q is more reactive than T.

C. R is more reactive than Z.

D. T and Z are in the same period.

24. A mixture of two substances is spotted on to a piece of chromatography paper. The paper was inserted into a beaker containing a liquid.



For separation of the substances to occur the mixture must

A. be placed so that the spot is just below the level of the liquid.

B. be soluble in the liquid.

C. contain substances of the same R_f values.

D. contain substances that are coloured.

25. Which of the following is the best method of obtaining pure water from ink?

A. Chromatography

B. Distillation

C. Filtration

D. Freezing

26. What happens when sodium chloride melts?

A. Covalent bonds in a giant lattice are broken.

B. Electrons are released from atoms.

C. Electrostatic forces of attraction between ions are overcome.

D. Molecules are separated into ions.

27. The formulae of the ions of four elements are shown below.

O^{2-} F^- Li^+ Mg^{2+}

Which statement about these ions is correct? They all have

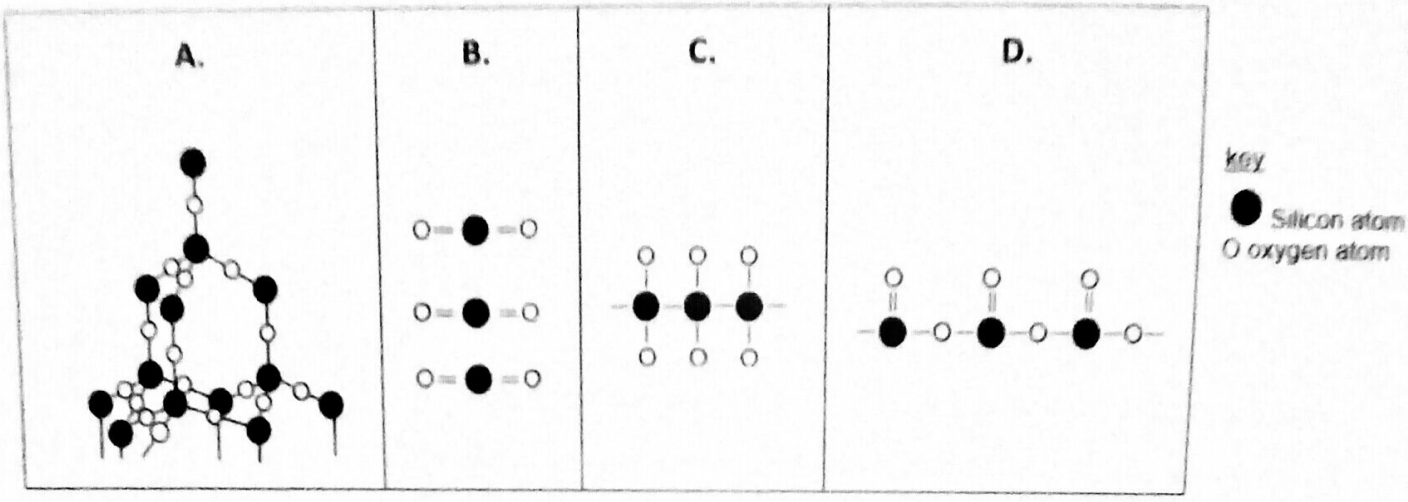
A. the same number of electrons in their outer shells.

B. the same electronic structure as a noble gas.

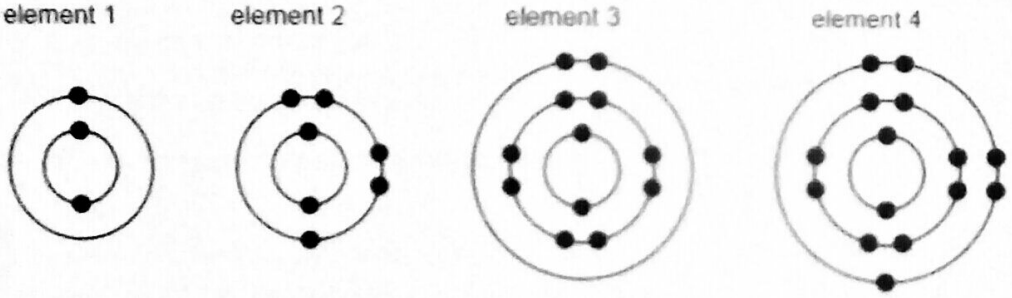
C. the same number of protons in their nuclei.

D. more electrons than protons.

28. Which diagram represents the structure of sand, SiO_2?



29. The diagrams show the arrangements of the electrons of four elements.



Which two elements are metals?

A. 1 and 2

B. 1 and 3

C. 2 and 4

D. 3 and 4

30. Element X is a solid at room temperature. It needs one electron per atom to gain the electronic structure of a noble gas. It is the least reactive element in its group. What is the element X?

A. At **B.** Cs **C.** F **D.** Li