

Name \_\_\_\_\_

ID Number \_\_\_\_\_

\_\_\_\_\_ [2 MARKS EACH]

(Circle the letter of the one alternative that best completes the statement or answers the question)

1. Are atoms made out of elements or are elements made out of atoms?

6. Referring to the periodic table, which pairs of elements would you expect to have similar properties?

- (a) Bismuth and aluminum.
- (b) Calcium and potassium.
- (c) Carbon and tin.
- (d) Iodine and sulfur.

7. How is the atomic number of an element defined?

- (a) The number of protons plus neutrons in the atom's nucleus.
- (b) The number of electrons minus the number of protons.
- (c) The number of protons in the atom's nucleus.
- (d) The number of electrons around the nucleus.

8. What is the number of neutrons in Fe-56?

- (a) 30 neutrons.
- (b) 56 neutrons.
- (c) 55 neutrons.
- (d) 26 neutrons.

9. Carbon-12 has a mass of 12.000 amu. However, when you look at the periodic table, you see that carbon's atomic mass is 12.011 amu. Why is there a discrepancy?

- (a) The discrepancy arises because the actual mass of carbon-12 is not exactly 12.000 amu. The real mass varies when it is measured several times. Therefore, an average observed mass is reported on the periodic table to reflect these experimental variations.
- (b) The discrepancy arises because carbon is present, not only in single atoms, but also in the form of diamond, buckminsterfullerene and graphite. These "allotropes" of carbon have many carbons bound together, making the average mass higher.
- (c) The discrepancy arises because there are different isotopes of carbon present in nature – not only carbon-12. A weighted average of the isotopic abundances gives an average atomic mass, which is reported on the periodic table.
- (d) The discrepancy arises because carbon combines with other elements to form compounds. For example, carbon monoxide, CO, has a higher mass because of the presence of oxygen. So, it is this average mass for carbon, including other atoms in its compounds, that is reported on the periodic table.

10. When an element emits a beta particle, it becomes an element that occupies

- (a) the same place in the periodic table.
- (b) a higher place in the periodic table of the elements.
- (c) a lower place in the periodic table.
- (d) All of these.
- (e) None of these.

11. Electric forces within the atomic nucleus tend to

- (a) hold it together.
- (b) Neither hold it together nor push it apart.
- (c) push it apart.
- (d) Hold it together and push it apart.

12. The product nucleus resulting from alpha or beta decay is that of

- (a) an ion of the same element.
- (b) a transmuted version of the same element.
- (c) a different isotope of the same element.
- (d) a completely different element.
- (e) None of these.

13. If the half life of a radioactive isotope is 1 day, then how much of the original isotope remains at the end of two days?

- (a) 50%.
- (b) 100%.
- (c) Zero.
- (d) 25%.
- (e) 12.5%.

14. The source of heat that warms hot springs and geysers is due to

- (a) pressure on the Earth's core.
- (b) radioactive decay in the earth's interior.
- (c) solar energy in the form of fossil fuels.
- (d) nuclear fusion.
- (e) molten-hot lava.

15. A nucleon has a greater mass when it is

- (a) locked in an atomic nucleus.
- (b) outside an atomic nucleus.
- (c) Same mass either way.

16. When U-235 undergoes fission, the two nuclei that result have a total of

- (a) 90 protons.
- (b) 91 protons.
- (c) 92 protons.
- (d) more than 92 protons.
- (e) less than 90 protons.

17. Which produces more energy: fusing a pair of hydrogen isotopes, or fusing a pair of helium isotopes?

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19. What changes during a physical change?

- (a) The chemical identity of a single material.
- (b) The physical attributes of a single material.
- (c) The color of the chemical.
- (d) The shapes of the atoms of a material.

20. Why is the tarnishing of a coin an example of a chemical change?

- (a) The coin turns into a different color.
- (b) The tarnishing of a coin is actually an example of a physical change because the tarnished coin is still accepted as currency.
- (c) The tarnish is a fundamentally different material.
- (d) It cannot be reversed.

21. Which of the following is not an example of a physical change?

- (a) Using a mechanical water purifier on a camping trip.
- (b) Accidentally leaving a piece of toast in the toaster until it is completely black.
- (c) Making coffee by mixing coffee grounds with hot water.
- (d) Forming lather with your hands from mixing shampoo and water.

22. How would you name the compound  $P_2O_5$ ?

- (a) Diphosphorus pentoxide.
- (b) Diphosphorus dioxide.
- (c) Phosphorus oxide.
- (d) Phosphorus pentoxide.

23. What does the Law of Conservation of Mass tell us about chemical reactions?

- (a) Chemical reactions always produce the desired products in 100% yield.
- (b) A chemical reaction involves the combination of reactants to make one compound that contains all of the starting elements.
- (c) During a chemical reaction, the mass of the reactants must be greater than that of the products since energy is released.
- (d) There is no detectable change in the total mass of materials as they chemically react to form new materials.

24. Which of the following actions is illegal when balancing a chemical equation?

- (a) Changing the coefficients in front of the reactants.
- (b) Adding coefficients to the front of a product.
- (c) Dividing all coefficients by a common factor.
- (d) Changing the subscripts following elements.

25. The correct name for  $SiF_4$  is:

- (a) Fluoride of silicon
- (b) Monosilicon tetrafluoride
- (c) Silicon tetrafluoride
- (d) Tetrafluorosilicon





39. A neutral element containing 14 electrons is a:

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

40. The symbol for the rare gas in the same period as sodium is:

- (a) He
- (b) Ne
- (c) Ar
- (d) Kr

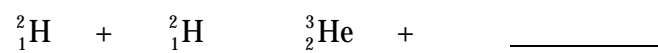
\_\_\_\_\_ (SHOW ALL OF YOUR WORK!)

41.

44. [6 MARKS] The isotope lithium-7 has a mass of 7.0160 atomic mass units, and the isotope lithium-6 has a mass of 6.0151 atomic mass units. Given the information that 92.58 percent of all lithium atoms found in nature are lithium-7 and 7.42 percent are lithium-6, calculate the atomic mass of lithium, Li.

45. [3 MARKS] Which has more atoms: a 1-gram sample of carbon-12 or a 1-gram sample of carbon-13? Explain.

46. [3 MARKS] Complete the following fusion reactions:



${}^3_1$





# PERIODIC TABLE OF THE ELEMENTS

1 1.0079 <b>H</b> hydrogen hydrogène	4 9.012 <b>Be</b> beryllium béryllium
3 6.941 <b>Li</b> lithium lithium	12 24.31 <b>Mg</b> magnesium magnésium
11 22.99 <b>Na</b> sodium sodium	

atomic number
atomic mass
<b>Symbol</b>
English name
French name*

\*all are masculine

2 4.003 <b>He</b> helium hélium	10 20.18 <b>Ne</b> neon néon				
5 10.811 <b>B</b> boron bore	6 12.011 <b>C</b> carbon carbone	7 14.007 <b>N</b> nitrogen azote	8 15.9994 <b>O</b> oxygen oxygène	9 18.998 <b>F</b> fluorine fluor	18 39.95 <b>Ar</b> argon argon
13 26.98 <b>Al</b> aluminum aluminium	14 28.086 <b>Si</b> silicon silicium	15 30.974 <b>P</b> phosphorus phosphore	16 32.07 <b>S</b> sulfur soufre	17 35.453 <b>Cl</b> chlorine chlore	