

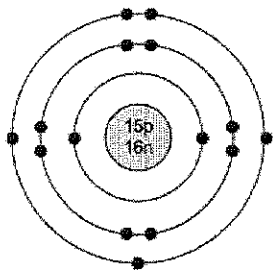
IV. Practice Questions

Section 4.1

Atomic theory explains the formation of compounds: Atomic Theory and Bonding

Circle the letter of the best answer. You can use the Periodic Table of the Elements on page 2 of your Data Pages to help you.

- Which subatomic particles are found in the nucleus of atoms?
 - only protons
 - only electrons
 - protons and neutrons
 - protons and electrons
- When forming ions, elements on the left side of the periodic table tend to behave in which of the following ways?
 - lose protons
 - gain protons
 - lose electrons
 - gain electrons
- What is the name of the reactive family of elements that form $1-$ ions?
 - halogens
 - noble gases
 - alkali metals
 - alkaline earth metals
- What is the atomic number of an atom with 19 protons, 19 electrons, and 21 neutrons?
 - 19
 - 21
 - 38
 - 39
- Which of the following describes an ion of chlorine?
 - 20 neutrons and 17 electrons
 - 20 neutrons and 18 electrons
 - 37 neutrons and 17 electrons
 - 37 neutrons and 18 electrons



- Identify the atom shown in the Bohr diagram above.
 - gallium
 - sulfur
 - oxygen
 - phosphorus
- How many lone pairs and bonding pairs of electrons appear in the Lewis diagram shown below of water?
 - two lone pairs and no bonding pairs
 - two lone pairs and two bonding pairs
 - no lone pairs and two bonding pairs
 - four lone pairs and four bonding pairs



- two lone pairs and no bonding pairs
- two lone pairs and two bonding pairs
- no lone pairs and two bonding pairs
- four lone pairs and four bonding pairs

IV. Practice Questions

Section 4.2

Atomic theory explains the formation of compounds: Names and Formulas of Compounds

Circle the letter of the best answer. You can use the Periodic Table of the Elements on page 2 of your Data Pages to help you.

- What is the formula for aluminum sulfide?
 - AlS
 - AlS₃
 - Al₃S₂
 - Al₃S₃
- What is the ionic charge of lead in PbO₂?
 - +1
 - +2
 - +3
 - +4
- Which of the following is the correct name for Fe₂(SO₄)₃?
 - iron(II) sulfate
 - iron(II) sulfide
 - iron(III) sulfate
 - iron(III) sulfide
- Which statement best describes the compound N₂O₃?
 - It is the ionic compound nitrogen oxide.
 - It is the covalent compound nitrogen oxide.
 - It is the ionic compound dinitrogen trioxide.
 - It is the covalent compound dinitrogen trioxide.
- Which of the following is the correct bond type and name for (NH₄)₂S?
 - ionic, ammonium sulfide
 - ionic, nitrogen hydrogen sulfide
 - covalent, ammonium sulfide
 - covalent, dinitrogen monohydrogen sulfide
- What is the formula for diphosphorus pentachloride?
 - PCl
 - PCl₅
 - P₂Cl₅
 - P₅Cl₂
- Which of the following is the correct name for SrCl₂?
 - strontium chloride
 - strontium dichloride
 - strontium(II) chloride
 - monostrontium dichloride
- What is the name for AuBr₃?
 - gold bromide
 - gold tribromide
 - gold(III) bromide
 - gold(III) bromine
- How many atoms of each of the following elements are present in nickel(III) sulfate?
 - nickel = 2, sulfur = 3
 - nickel = 1, sulfur = 1, oxygen = 4
 - nickel = 3, sulfur = 1, oxygen = 4
 - nickel = 2, sulfur = 3, oxygen = 12
- What is the formula for manganese(II) chloride?
 - MnCl
 - MnCl₂
 - Mn₂Cl
 - MgCl₂

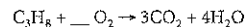
IV. Practice Questions

Section 4.3

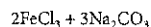
Atomic theory explains the formation of compounds: Chemical Equations

Circle the letter of the best answer. You can use the Periodic Table of the Elements on page 2 of your Data Pages to help you.

1. What coefficient is needed in front of O_2 in order to balance the following equation?



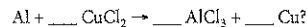
- A. 2
B. 5
C. 6
D. 10
2. In a chemical reaction, 40.3 g of magnesium oxide is broken down to yield 24.3 g of magnesium and 16.0 g of oxygen. What is this an example of?
- A. Dalton's atomic theory
B. the law of constant proportions
C. the law of conservation of mass
D. the law of conservation of energy
3. List the total number of each type of atom found in the following reactants:



	Fe	Cl	Na	C	O
I	2	6	6	3	3
II	2	3	6	1	3
III	2	6	6	3	9
IV	1	3	2	1	3

- A. I
B. II
C. III
D. IV

4. Which of the following is the correctly balanced equation for the following skeleton equation?



- A. $Al + CuCl_2 \rightarrow AlCl_3 + Cu$
B. $Al + 3CuCl_2 \rightarrow 2AlCl_3 + Cu$
C. $2Al + 3CuCl_2 \rightarrow 2AlCl_3 + 3Cu$
D. $6Al + 3CuCl_2 \rightarrow 2AlCl_3 + 6Cu$
5. Which of the following equations is correctly balanced?
- A. $Al + Br_2 \rightarrow AlBr_3$
B. $Al + 3Br_2 \rightarrow AlBr_3$
C. $Al + 3Br_2 \rightarrow 2AlBr_3$
D. $2Al + 3Br_2 \rightarrow 2AlBr_3$
6. Rewrite the following word equation as a balanced equation.

Potassium sulfate and lead(II) nitrate react to make potassium nitrate and lead(II) sulfate.

- A. $K_2S + Pb(NO_3)_2 \rightarrow 2KNO_3 + PbS$
B. $K_2SO_4 + Pb(NO_3)_2 \rightarrow 2KNO_3 + PbSO_4$
C. $3K_2SO_4 + Pb_3N_2 \rightarrow 2K_3N + 3PbSO_4$
D. $3PSO_4 + Pb_3N_2 \rightarrow P_3N + 3PbSO_4$

7. Write the skeleton equation for the following reaction.

Iron(III) bromide reacts with sodium hydroxide to yield iron(III) hydroxide and sodium bromide.

- A. $FeBr_3 + NaOH \rightarrow Fe(OH)_3 + NaBr$
B. $FeBr_3 + SOH \rightarrow Fe(OH)_3 + SBr$
C. $FeBr + NaOH \rightarrow FeOH + NaBr$
D. $IBr + NaOH \rightarrow IOH + NaBr$

IV. Practice Questions

Section 5.1

Compounds are classified in different ways: Acids and Bases

Circle the letter of the best answer. Use the charts on page 3 of your Data Pages to help you answer the questions.

1. What is the pH of an acidic substance?
- A. between 4 and 8
B. greater than 7
C. less than 7
D. equal to 7
2. A sample of grapes is crushed, and the pH is tested using three different indicators. Which set of colours is correct for the grapes?

	Methyl Orange	Bromothymol Blue	Indigo Carmine
I.	yellow	yellow	yellow
II.	red	yellow	blue
III.	red	blue	blue
IV.	yellow	blue	yellow

- A. I
B. II
C. III
D. IV
3. You have a sample to test in a lab. The sample looks like milk. Choose the two best indicators for testing if the sample is in the same pH range as milk.
- A. litmus and phenolphthalein
B. methyl orange and methyl red
C. methyl red and bromothymol blue
D. phenolphthalein and indigo carmine
4. A property of acids is that they react with metals. If you placed a cut lemon and a raw egg on two spots on bare metal, which of the following would you observe?
- A. Only the egg would react.
B. Only the lemon would react.
C. Both the lemon and the egg would react.
D. Neither the lemon nor the egg would react.
5. What kind of substance feels slippery, turns red litmus blue, and has a pH > 7?
- A. a base, such as NaOH
B. an acid, such as HCl
C. a salt, such as $MgCl_2$
D. a neutral substance, such as HNO_3
6. A solution has a pH of 11. Acid is added until pH = 5. Which indicator would be a good choice to know when the solution has reached pH = 5?
- A. methyl red
B. methyl orange
C. phenolphthalein
D. indigo carmine
7. A substance used in producing plastic is HCl. It is a(n) _____ and is named _____.
- A. salt, hydrogen chloride
B. acid, hydrogen chlorate
C. base, hydrogen chloride
D. acid, hydrogen chloride

IV. Practice Questions

Section 5.2

Compounds are classified in different ways: Salts

Circle the letter of the best answer.

- Which of the following correctly lists, in order, an acid, a base, and a salt?
 - HCl, NaOH, BaCl₂
 - HNO₃, CaCl₂, NaOH
 - NaCl, MgBr₂, NH₄OH
 - Ba(OH)₂, HNO₃, H₃PO₄
- Which reaction is an acid-base neutralization?
 - HCl + Ca → CaCl₂ + H₂
 - CaO + H₂O → Ca(OH)₂
 - HCl + BaCO₃ → BaCl₂ + H₂O + CO₂
 - HNO₃ + Ca(OH)₂ → Ca(NO₃)₂ + H₂O
- Which of the following are produced when Ca + HCl react?
 - CaHCl
 - CaH + Cl₂
 - CaCl₂ + H
 - CaCl₂ + H₂
- Which of the following completes the reaction below?

$$\text{SO}_3(\text{g}) + \text{H}_2\text{O}(\ell) \rightarrow \underline{\hspace{2cm}}$$
 - H₂SO₄(aq)
 - H₂SO₃(aq)
 - HSO₄(aq)
 - HSO₃(aq)
- Consider the following reaction.

$$\text{BaO} + \text{H}_2\text{O} \rightarrow \underline{\hspace{2cm}}$$

Determine the formula of the product(s), and indicate if the product is an acid, a base, or a neutral compound.

- Ba(OH)₂, a base
- Ba(OH)₂, an acid
- BaO + H₂, neutral compounds
- Ba + H₂O₂, neutral compounds

- Which basic compound could be added to lakes to help deal with acid precipitation?
 - NaCl
 - NaOH
 - CaCO₃
 - HCl
- Which of the following groups contains only salts?
 - NaCl, HBr
 - NH₄OH, LiOH
 - NaCl, Ca(NO₃)₂
 - NaCl, Ca(NO₃)₂, NH₄OH, LiOH, HBr
- Which of the following is a balanced equation for the reaction between an acid and a carbonate?
 - 2CH₃COOH + 2NaOH → 2NaCH₃COO + H₂O
 - 2HCl + CaCO₃ → CaCl₂ + H₂O + CO₂
 - 2HCl + Mg → MgCl₂ + H₂
 - CO₂ + H₂O → H₂CO₃
- Identify the products that complete the following reaction.

$$\text{H}_3\text{PO}_4 + \text{Ba}(\text{OH})_2 \rightarrow \underline{\hspace{2cm}}$$
 - BaPO₄ + H₂O
 - Ba₃P₂ + H₂O
 - BaH₂PO₄ + H₂O
 - Ba₃(PO₄)₂ + H₂O

10. Which of the following reactions are written correctly?

I.	$\text{HNO}_3 + \text{Ba}(\text{OH})_2 \rightarrow \text{Ba}(\text{NO}_3)_2 + \text{H}_2\text{O}$
II.	$\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_2$
III.	$\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{LiOH}$

- I and II
- I and III
- II and III
- I, II, and III

IV. Practice Questions

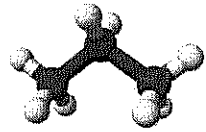
Section 5.3

Compounds are classified in different ways: Organic Compounds

Circle the letter of the best answer.

- Which of the following is not an organic compound?
 - CH₄
 - CO₂
 - C₆H₅COOH
 - K₂HC₆H₇O₇
- Which of the following best describes organic compounds?
 - almost all compounds that contain carbon
 - compounds made exclusively by living things
 - compounds made of mostly carbon and oxygen, such as oxides and carbonates
 - any compound that does not include carbon, except compounds such as CO₂, CO, and compounds like Li₂CO₃
- What is a hydrocarbon?
 - another name for the acid H₂CO₃
 - another name for an organic alcohol
 - one of the products of an acid-base neutralization
 - an organic compound that is made of only carbon and hydrogen
- Which of the following is an inorganic compound?
 - C₆H₁₂O₆
 - NO₂
 - CH₃CH₂COOH
 - C₄H₁₀
- Consider the following representation of 2-propanol, a kind of rubbing alcohol. What kind of representation is used in the diagram?

$$\begin{array}{ccccc} & \text{H} & & \text{OH} & & \text{H} \\ & | & & | & & | \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{H} \\ & | & & | & & | \\ & \text{H} & & \text{H} & & \text{H} \end{array}$$
 - chemical name
 - molecular formula
 - structural formula
 - space-filling model

- Which of the following is an organic compound?
 - CaH₃
 - H₂CO₃
 - C₂H₆O
 - Ca₂CO₃
- CH₃(CH₂)₃CH₃ is an example of what type of compound?
 - an acid
 - a salt
 - a base
 - an organic compound
- In the following diagram of propane, light-coloured spheres represent hydrogen atoms and dark-coloured spheres represent carbon atoms. What is the chemical formula of propane?
 
 - C₃H₃
 - 8C₃H
 - C₃H₈
 - 3C₃H
- Ethanol (CH₃CH₂OH) is used in alcoholic beverages and also as a fuel. What kind of compound is ethanol?
 - inorganic
 - organic
 - ionic
 - multivalent

10. Which of the following is not an inorganic compound?

- methane
- carbon dioxide
- barium carbonate
- ammonium chloride

IV. Practice Questions

Section 6.1

Chemical reactions occur in predictable ways: Types of Chemical Reactions

Circle the letter of the best answer.

1. What type of reaction is the following?
 $2Al + 3CuCl_2 \rightarrow 2AlCl_3 + 3Cu$
A. synthesis
B. neutralization
C. single replacement
D. double replacement
2. Which equation shows a double replacement reaction?
A. $2Mg + O_2 \rightarrow MgO$
B. $2H_2O_2 \rightarrow 2H_2O + O_2$
C. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
D. $Na_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2NaCl$
3. KCl reacts with $Pb(NO_3)_2$. What type of reaction is this?
A. combustion
B. neutralization
C. single replacement
D. double replacement
4. Solid magnesium reacts with nitric acid to produce hydrogen gas and another product. What is the other product that would be formed in this reaction?
 $Mg + 2HNO_3 \rightarrow ___ + H_2$
A. $Mg(NO_3)_2$
B. Mg_3N_2
C. MgO
D. O_2
5. Which of the following balanced equations represents a synthesis reaction?
A. $2LiF \rightarrow 2Li + F_2$
B. $Ca + Br_2 \rightarrow CaBr_2$
C. $Ba + CuSO_4 \rightarrow BaSO_4 + Cu$
D. $KOH + HNO_3 \rightarrow KNO_3 + H_2O$
6. For a neutralization reaction to occur, which of the following should be added to react with NaOH?
NaOH + $___$
A. F_2
B. Ca
C. HCl
D. $Mg(NO_3)_2$
7. What is the missing reactant in this synthesis reaction, and what are the coefficients needed to balance this equation?
 $Na + ___ \rightarrow NaF$
A. Na + F \rightarrow NaF
B. Na + $F_2 \rightarrow$ NaF₂
C. Na + $F_2 \rightarrow$ 2NaF
D. 2Na + $F_2 \rightarrow$ 2NaF
8. If Na_2O undergoes decomposition, what will the products be?
A. Na + O
B. Na + O_2
C. $Na_2 + O$
D. $Na_2 + O_2$
9. If aluminum bromide decomposes, which of the following is the correct balanced formula equation for the reaction?
A. $AlBr_3 \rightarrow Al + Br$
B. $AlBr_3 \rightarrow Al + 3Br_2$
C. $2AlBr_3 \rightarrow 2Al + Br_2$
D. $2AlBr_3 \rightarrow 2Al + 3Br_2$
10. Which of the following balanced equations correctly represents the combustion of butene, C_4H_8 ?
A. $C_4H_8 + 6O_2 \rightarrow 4CO_2 + 4H_2O$
B. $C_4H_8 + O_2 \rightarrow 8CO_2 + 8H_2O$
C. $C_4H_8 + O_2 \rightarrow 4CO_2 + H_2O$
D. $C_4H_8 + O_2 \rightarrow CO_2 + H_2O$

IV. Practice Questions

Section 6.2

Chemical reactions occur in predictable ways: Factors Affecting the Rate of Chemical Reactions

Circle the letter of the best answer.

1. When zinc metal is added to hydrochloric acid, it reacts to produce hydrogen gas. Which of the following pairs would react at the greatest rate?
A. a chunk of zinc and dilute HCl
B. a chunk of zinc and concentrated HCl
C. powdered zinc and dilute HCl
D. powdered zinc and concentrated HCl
2. Cement is used in many construction projects. When used in building projects, water is sprayed on the surface of the drying cement. This allows the cement to dry evenly both on the surface and in the middle. A strange fact about cement is that, as cement “cures” (what we think of as drying), it undergoes an exothermic reaction. In other words, cement is actually giving off heat energy as it dries, which can speed up drying even more. Which factor affecting the rate of chemical reactions is involved when builders spray water onto drying cement?
A. addition of a catalyst
B. change in temperature
C. change in surface area
D. change in concentration
3. Which of the following is an example of decreasing reaction rate?
A. scrambling an egg
B. adding food colouring
C. putting food in a refrigerator
D. cleaning a clogged drain with concentrated vinegar and baking soda
4. In order to start a campfire, wood is chopped into many small pieces, called kindling. Which factor makes it easier to light a fire using kindling instead of large pieces of wood?
A. temperature
B. concentration
C. surface area
D. catalyst
5. If you have had your gall bladder removed, you may have trouble digesting fats. It is possible in some cases to take an enzyme called lipase, which helps to digest fats. With respect to rates of reactions, which factor is best illustrated by taking lipase?
A. introducing a catalyst
B. increasing temperature
C. increasing surface area
D. increasing concentration
6. Food is digested in your body with the aid of a number of factors that affect the reaction rates. Which of the following affects the rate of food digestion by changing surface area?
A. chewing food
B. a body temperature of 37°C
C. enzymes such as lipase and sucrase
D. the concentration of HCl in the stomach

IV. Practice Questions

Section 7.1

The atomic theory explains radioactivity: Atomic Theory, Isotopes, and Radioactive Decay

Circle the letter of the best answer.

- Which of the following shows alpha radioactive decay?
 - ${}^{13}_5\text{B} \rightarrow {}^{12}_5\text{C} + {}^4_2\text{He}$
 - ${}^{23}_{11}\text{NaCl} \rightarrow {}^{23}_{11}\text{Na} + {}^{36}_{17}\text{Cl}_2$
 - ${}^{60}_{28}\text{Ni}^* \rightarrow {}^{60}_{28}\text{Ni} + {}^0_0\gamma$
 - ${}^{232}_{92}\text{U} \rightarrow {}^{228}_{90}\text{Th} + {}^4_2\text{He}$
- Which of the following shows beta radioactive decay?
 - ${}^{211}_{87}\text{Fr} \rightarrow {}^{207}_{85}\text{At} + {}^4_2\text{He}$
 - ${}^{137}_{55}\text{Cs} \rightarrow {}^{137}_{56}\text{Ba} + {}^0_{-1}e + {}^0_0\gamma$
 - ${}^{60}_{28}\text{Ni}^* \rightarrow {}^{60}_{28}\text{Ni} + {}^0_0\gamma$
 - $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$
- Which of the following is an example of gamma radioactive decay?
 - ${}^{40}_{19}\text{K}^* \rightarrow {}^{40}_{19}\text{K} + {}^0_0\gamma$
 - ${}^{90}_{38}\text{Sr} \rightarrow {}^{90}_{39}\text{Y} + {}^0_{-1}e$
 - ${}^{196}_{79}\text{Au} \rightarrow {}^{192}_{77}\text{Ir} + {}^4_2\alpha$
 - ${}^{222}_{86}\text{Rn} \rightarrow {}^{218}_{84}\text{Po} + {}^4_2\text{He}$
- What type of decay occurs in the following reaction?

$${}^{24}_{11}\text{Na} \rightarrow {}^{24}_{12}\text{Mg} + {}^0_{-1}e$$
 - alpha
 - beta
 - gamma
 - decomposition
- Which is the correct parent nucleus to give the following products?

$$\text{_____} \rightarrow {}^{227}_{89}\text{Ac} + {}^4_2\text{He}$$
 - ${}^{231}_{87}\text{Fr}$
 - ${}^{225}_{87}\text{Fr}$
 - ${}^{223}_{87}\text{Fr}$
 - ${}^{231}_{91}\text{Pa}$
- How does each of the isotopes of an atom differ?
 - in the number of protons
 - in the number of electrons
 - in the number of neutrons
 - in the number of protons, electrons, and neutrons
- How many protons and neutrons are in the following isotope?

$${}^{37}_{17}\text{Cl}$$
 - 17 protons, 17 neutrons
 - 17 protons, 20 neutrons
 - 17 protons, 37 neutrons
 - 37 protons, 17 neutrons
- If an isotope has 55 protons and 82 neutrons, which of the following correctly represents the isotope?
 - ${}^{137}_{55}\text{Cs}$
 - ${}^{137}_{82}\text{Cs}$
 - ${}^{137}_{55}\text{Cs}$
 - ${}^{137}_{82}\text{Pb}$
- Which of the following correctly completes the following radioactive decay?

$${}^{201}_{80}\text{Hg} \rightarrow {}^{201}_{82}\text{Tl} + \text{_____}$$
 - ${}^0_{-1}e$
 - ${}^0_0\gamma$
 - ${}^1_1\text{H}$
 - ${}^4_2\text{He}$
- Which of the following correctly completes the following radioactive decay?

$${}^{233}_{91}\text{Pa} \rightarrow {}^{229}_{86}\text{Ac} + \text{_____}$$
 - ${}^0_{-1}e$
 - ${}^0_0\gamma$
 - ${}^1_1\text{H}$
 - ${}^4_2\text{He}$

IV. Practice Questions

Section 7.2

The atomic theory explains radioactivity: Half-Life

Circle the letter of the best answer. You can use the Common Isotope Pairs chart on page 4 of your Data Pages to help you.

- What is a half-life?
 - the time required for nuclei to undergo nuclear fusion
 - the time required for nuclei to undergo nuclear fission
 - the time required for half the nuclei in a sample to decay
 - the time it takes for an isotope to react with any other substance to produce a new compound
- The carbon-14 isotope has a half-life of 5730 y. What percent of carbon-14 isotope will be present after 17 190 y?
 - 12.5 percent
 - 25 percent
 - 50 percent
 - 100 percent
- A 10 g sample of potassium-40 undergoes radioactive decay until 2.5 g of potassium-40 is present. How many half-lives have occurred?
 - 0
 - 1
 - 2
 - 3
- Suppose a meteorite is analyzed and found to contain equal amounts of uranium-238 and lead-206. How long ago did the meteorite form?
 - 710 million years
 - 1420 million years
 - 4.5 billion years
 - 9 billion years
- What is carbon dating?
 - the exact age of a sample of carbon
 - the process of determining the time required to complete the carbon cycle
 - the process of determining the age of an object by measuring the amount of carbon-14 remaining in that object
 - the process of looking for fossils from specific time periods and determining the age of the carbon sample relative to the fossil
- If a 10 g rock sample of isotope ${}^{49}\text{K}$ undergoes two half-lives to make daughter isotope ${}^{49}\text{Ar}$, what is the mass of the total sample at the completion of the second half-life?
 - 10 g
 - 5.0 g
 - 2.5 g
 - 1.25 g
- If you start with 100 g of isotope ${}^{238}\text{U}$, what mass of this parent material will be left after four half-lives?
 - 50 g
 - 25 g
 - 12.5 g
 - 6.25 g
- After three half-lives have passed for carbon-14, a 4.0 g sample remains of the parent isotope. What mass of the parent isotope was originally present?
 - 0.5 g
 - 8.0 g
 - 16 g
 - 32 g

IV. Practice Questions

Section 7.3

The atomic theory explains radioactivity: Nuclear Reactions

Circle the letter of the best answer.

- What is nuclear fission?
 - the process in which two low mass nuclei join together to make a more massive nucleus
 - the process of cell division that results in two new cells that are identical to their parent cell
 - the splitting of a massive nucleus into two less massive nuclei, subatomic particles, and energy
 - the process in which a parent cell splits into two daughter cells of approximately equal size, often occurring in single celled organisms
- What is nuclear fusion?
 - the process in which two low mass nuclei join together to make a more massive nucleus
 - the process of cell division that results in two new cells that are identical to their parent cell
 - the splitting of a massive nucleus into two less massive nuclei, subatomic particles, and energy
 - the process in which a parent cell splits into two daughter cells of approximately equal size, often occurring in single celled organisms
- Which equation represents nuclear fission?
 - ${}_{19}^{40}\text{K} \rightarrow {}_{20}^{40}\text{Ca} + {}_{-1}^0\text{e} + \text{energy}$
 - $2\text{C}_3\text{H}_7\text{OH} + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 8\text{H}_2\text{O}$
 - ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n} + \text{energy}$
 - ${}^1_0\text{n} + {}^{235}_{92}\text{U} \rightarrow {}^{92}_{36}\text{Kr} + {}^{141}_{56}\text{Ba} + 3 {}^1_0\text{n} + \text{energy}$
- Which equation represents nuclear fusion?
 - ${}_{53}^{131}\text{I} \rightarrow {}_{54}^{131}\text{Xe} + {}^0_{-1}\beta$
 - ${}^{238}_{92}\text{U} \rightarrow {}^{234}_{90}\text{Th} + {}^4_2\text{He} + 2\gamma$
 - ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n} + \text{energy}$
 - ${}^1_0\text{n} + {}^{235}_{92}\text{U} \rightarrow {}^{144}_{42}\text{Mo} + {}^{89}_{50}\text{Sn} + 3 {}^1_0\text{n} + \text{energy}$
- What is the daughter nucleus to complete the following nuclear fission reaction?
 ${}^1_0\text{n} + {}^{235}_{92}\text{U} \rightarrow {}^{118}_{43}\text{Tc} + \text{_____} + 3 {}^1_0\text{n} + \text{energy}$
 - ${}^{116}_{49}\text{In}$
 - ${}^{116}_{49}\text{Tm}$
 - ${}^{117}_{49}\text{In}$
 - ${}^{118}_{49}\text{Tm}$
- Which of the following is used to control the rate of the chain reaction that occurs in a nuclear reactor?
 - Add uranium-235 to the reactor.
 - Use fossil fuels (like gas or coal).
 - Insert cadmium rods into the nuclear reactor.
 - Remove cadmium rods from the nuclear reactor.
- Which statement about nuclear fusion is **not** true?
 - Two lightweight nuclei join together to form a heavier nucleus.
 - A typical reaction showing nuclear fusion is:
 ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n} + \text{energy}$
 - Lightweight nuclei will not release excess energy if the nucleus generated by fusion is heavier than iron.
 - There are many commercial fusion reactors in the world. Canada has a series of them called CANDU reactors.