Science 20

Unit A: Chemical Change

Assignment Booklet A1

Alberta
EDUCATION

FOR TEACHER'S USE ONLY

Summary

	Total Possible Marks	Your Mark
Chapter 1 Assignment	79	

Teacher's Comments

Science 20
Unit A: Chemical Change
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Chapter 1 Assignment

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	

You may find the following Internet sites useful:

- Alberta Education, **http://www.education.gov.ab.ca**
- Learning Technologies Branch, **http://www.education.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.education.gov.ab.ca**

Exploring the electronic information superhighway can be educational and entertaining. However, be aware that these computer networks are not censored. Students may unintentionally or purposely find articles on the Internet that may be offensive or inappropriate. As well, the sources of information are not always cited and the content may not be accurate. Therefore, students may wish to confirm facts with a second source.

ASSIGNMENT BOOKLET A1
SCIENCE 20: UNIT A
CHAPTER 1 ASSIGNMENT

This Assignment Booklet is worth 79 marks out of the total 186 marks for the assignments in Unit A. The value of each assignment and each question is stated in the left margin.

Read all parts of your assignment carefully, and record your answers in the appropriate places. If you have difficulty with an assignment, go back to the textbook and review the appropriate lesson. Be sure to proofread your answers carefully before submitting your Assignment Booklet.

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Chapter 1 Assignment: Aqueous Solutions

For questions 1 to 6, read each question carefully. Decide which of the choices BEST completes the statement. Place your answer in the blank space given.

1

_____ 1. An atom has 19 protons and 20 neutrons. The number of electrons in this atom is

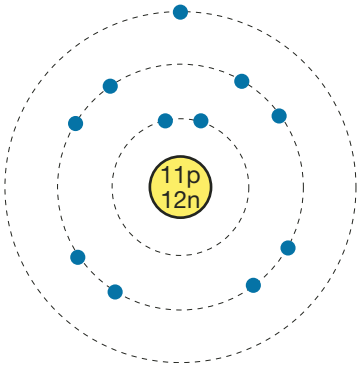
A. 1
B. 19
C. 20
D. 39

1

_____ 2. An atom has 19 protons and 20 neutrons. The identity of this element is

A. calcium
B. magnesium
C. potassium
D. sodium

Use the following diagrams to answer questions 3 to 5.



(1) _____ 3. The element represented in the diagram on the left is

A. aluminium
B. fluorine
C. lithium
D. sodium

(1) _____ 4. The element represented in the diagram on the right is

A. aluminium
B. fluorine
C. lithium
D. sodium

(1) _____ 5. The diagram on the right is a(an)

A. atomic diagram
B. Bohr diagram
C. Lewis dot diagram
D. energy level diagram

(1) _____ 6. For a chlorine atom to become a chloride ion, the chlorine atom must

A. gain one electron
B. lose one electron
C. share an electron
D. lose all its electrons

7. Match each description with the appropriate term listed. Place your answer in the blank space given.

i. electron	ii. energy level	iii. atomic number
iv. neutron	v. mass number	vi. valence electron
vii. proton	viii. cation	ix. atomic mass
x. element	xi. anion	xii. atom

½ _____ a. the number of protons in the nucleus of an atom

½ _____ b. the smallest part of an element that has all the properties of that element

½ _____ c. a negatively charged particle located in the region surrounding the nucleus of an atom

½ _____ d. the total number of protons and neutrons in an atom

½ _____ e. a neutral particle located in the nucleus of an atom

½ _____ f. an electron that occupies the outermost energy level in an atom

½ _____ g. the average mass of the atoms of an element including all isotopes

½ _____ h. a specific region surrounding the nucleus that is available for electrons

½ _____ i. a pure substance that cannot be broken down into simpler substances by chemical means

½ _____ j. a positively charged particle located in the nucleus of an atom

½ _____ k. a positively charged ion

½ _____ l. a negatively charged ion

8. Decide whether each statement is true (T) or false (F). Place your answer in the blank space given.

½ _____ a. Most of the mass of an atom is in the electron cloud.

½ _____ b. A proton has a charge of 1+.

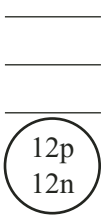
½ _____ c. Elements that are very reactive have a filled outermost energy level.

½ _____ d. A Lewis dot diagram shows only the valence electrons.

½ _____ e. Anions tend to form from metallic atoms.

½ _____ f. Anions and cations have unequal numbers of protons and electrons.

(2) 9. Complete the following concise Bohr diagram, and name the element.



Element: _____

Return to page 3 of the Distance Learning Student Guide, and begin Lesson 1.2.

For questions 10 to 13, read each question carefully. Decide which of the choices BEST completes the statement or answers the question. Place your answer in the blank space given.

(1) _____ 10. Which is an example of an ionic compound?

A. aluminium
B. plastic
C. rock salt
D. sugar

(1) _____ 11. Sodium and chlorine form a bond when

A. sodium gains one electron and chlorine loses one electron
B. sodium loses one electron and chlorine gains one electron
C. sodium gains seven electrons and chlorine loses seven electrons
D. sodium loses seven electrons and chlorine gains seven electrons

(1) _____ 12. Carbon bonds with hydrogen to obtain a full outer energy level by

A. both carbon and hydrogen losing electrons
B. both carbon and hydrogen sharing electrons
C. carbon gaining electrons and hydrogen losing electrons
D. carbon losing electrons and hydrogen gaining electrons

(1) _____ 13. Two properties of metallic elements are

A. malleable and insoluble in water
B. flexible and high melting point
C. brittle and good conductor of heat and electricity
D. insoluble in water and does not conduct electricity

14. Match each description with the appropriate term listed. Place your answer in the blank space given.

i. non-metal	ii. ionic bond	iii. molecular compound
iv. metal	v. molecule	vi. ionic compound
vii. covalent bond	viii. compound	

½ _____ a. a pure substance formed from a metal and a non-metal

½ _____ b. a malleable and ductile element that has lustre, has good heat and electrical conductivity, and tends to form positive ions

½ _____ c. a particle containing a fixed number of covalently bonded, non-metal ions

½ _____ d. a bond formed by the simultaneous attraction between positive and negative ions

½ _____ e. a pure substance formed from atoms of two or more elements with different atoms joined in fixed ratios

½ _____ f. an element that is not flexible, does not conduct electricity, and tends to form negative ions

½ _____ g. a bond formed by the simultaneous attraction of two nuclei for a shared pair of electrons

½ _____ h. a pure substance formed from non-metals

15. Decide whether each statement is true (T) or false (F). Place your answer in the blank space given.

½ _____ a. If an atom gains an electron, it becomes negatively charged.

½ _____ b. Gold is a good material to use for recordable CDs because it reflects light very well.

½ _____ c. When bonding to other elements, it is easier for a sodium atom to gain seven electrons than to lose one electron.

½ _____ d. Molecular compounds are more likely to melt than ionic compounds.

3 16. In terms of covalent bonding, explain why just four hydrogen atoms combine with a single carbon atom to form a stable molecule.

_____

_____

_____

_____

(2) 17. List the three categories of matter represented by rock salt, hard plastic, and aluminium foil.

_____

_____

Return to page 4 of the Distance Learning Student Guide, and begin Lesson 1.3.

For questions 18 to 21, read each question carefully. Decide which of the choices BEST completes the statement or answers the question. Place your answer in the blank space given.

(1) _____ 18. Water is a good medium for chemical change because it

A. helps the solute mix uniformly
B. breaks the bonds of the solute(s)
C. allows new bonds to form, allowing for new substances
D. all of the above

(1) _____ 19. Cobalt(II) nitrate is dissolved in water. The cobalt(II) nitrate is considered to be the

A. product
B. solution
C. solvent
D. solute

(1) _____ 20. Water is an effective solvent for ionic compounds because

A. each water molecule has a negative end and a positive end
B. water and ionic compounds have the same charge
C. ionic compounds have a negative charge
D. water has a negative charge

(1) _____ 21. Which substance is a non-electrolyte?

A. calcium carbonate
B. aqueous ethanol
C. hydrochloric acid
D. sodium sulfate

22. Match each description with the appropriate term listed. Place your answer in the blank space given.

i. solute	ii. exothermic change	iii. non-electrolyte
iv. solvent	v. solution	vi. chemical change
vii. dissociation	viii. endothermic change	ix. aqueous solution
x. electrolyte		

(½) _____ a. a substance in a solution that breaks down the bonds of a solute; a substance that does the dissolving and is in greater proportion in the mixture

(½) _____ b. a solute that forms a solution that conducts electricity

(½) _____ c. a change in which one or more new substances with different properties are formed

(½) _____ d. a homogeneous mixture of dissolved substances that contains a solute and a solvent

(½) _____ e. a chemical change in which energy is absorbed from the surroundings

(½) _____ f. a solution in which water is the solvent

(½) _____ g. the separation of an ionic compound into individual ions in a solution

(½) _____ h. a chemical change in which energy, usually in the form of heat, is released into the surroundings

(½) _____ i. a substance in a solution whose bonds are broken by a solvent; a substance that dissolves

(½) _____ j. a solute in a solution that does not conduct electricity

23. Decide whether each statement is true (T) or false (F). Place your answer in the blank space given.

(½) _____ a. Some molecular compounds dissolve in water.

(½) _____ b. It is important to rinse the probes of a conductivity meter when testing more than one solution.

(½) _____ c. Aqueous acetone is extremely flammable.

(½) _____ d. As a general rule, solutions with ionic compounds are electrolytes and solutions with molecular compounds are non-electrolytes.

(3) 24. Describe how an electrolyte conducts electricity.

_____

_____

_____

_____

Return to page 6 of the Distance Learning Student Guide, and begin Lesson 1.4.

For questions 25 to 29, read each question carefully. Decide which of the choices BEST completes the statement or answers the question. Place your answer in the blank space given.

(1) _____ 25. A concentrated solution is one that has

A. no solvent
B. more solute than solvent
C. a high ratio of solute to solvent
D. a low ratio of solute to solvent

(1) _____ 26. Which is an advantage of selling plant fertilizer as a powder rather than as a liquid?

A. Transportation costs are reduced.

B. The powder must be stored in a childproof container.

C. The powder may be a health hazard if proper procedures are not followed during mixing.

D. The gardener has to be able to read directions carefully and mix the proper amount of solvent and solute.

(1) _____ 27. Which household product is a dilute solution?

A. vinegar
B. orange juice
C. oven cleaner
D. toilet bowl cleaner

(1) _____ 28. A solution is diluted by removing half the amount and then adding solvent to return the solution to its original volume. This process is repeated two more times. What fraction of the original concentration is the concentration of the final solution after the third dilution?

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. $\frac{3}{4}$

(1) _____ 29. Which is **not** a reason why a solution with a greater concentration reacts faster than a solution that is more dilute?

A. A chemical reaction is a result of collisions between particles.

B. A dilute solution has more particles of solute available for collisions than a concentrated solution.

C. A concentrated solution has more particles of solute available for collisions than a dilute solution.

D. The probability of collisions increases as the number of solute particles within a system increases.

30. Decide whether each statement is true (T) or false (F). Place your answer in the blank space given.

(½) _____ a. The carbonated water in fountain pop is the solute.

(½) _____ b. A theory stating that chemical reactions involve the collision and rearrangement of particles is known as qualitative reaction theory.

(½) _____ c. A solution that contains a low ratio of solute to solvent is a dilute solution.

(½) _____ d. The ratio of quantity of solvent to quantity of solution is the concentration of a solution.

(2) 31. Describe two ways in which you can determine the relative concentrations of two solutions.

_____

_____

_____

Return to page 7 of the Distance Learning Student Guide, and begin Lesson 1.5.

For questions 32 to 41, read each question carefully. Decide which of the choices BEST completes the statement or answers the question. Place your answer in the blank space given.

(1) _____ 32. Expressing concentration as moles of solute per litre of solution is used by

A. scientists and lab technicians
B. manufacturers of consumer products
C. agencies that set health standards and safety standards
D. none of the above

(1) _____ 33. For which calculation is the following formula used?

$$\frac{\text{mL of solute}}{\text{mL of solution}} \times 100\%$$

A. molar concentration
B. parts per million
C. percent by volume
D. percent of solvent

(1) _____ 34. A bottle of insect repellent states that the percent by volume concentration of DEET is 14%. What volume of DEET is in a 500-mL container?

A. 35 mL
B. 70 mL
C. 140 mL
D. 500 mL

(1) _____ 35. Which concentration measurement is used for very dilute solutions?

A. percent by volume
B. parts per million
C. moles per litre
D. milligrams per litre

(1) _____ 36. A gardener requires 2000 mL of insecticidal soap solution with a concentration of 7.0% by volume concentration. The volume of insecticidal soap needed is

A. 3.5×10^1 mL
B. 1.4×10^2 mL
C. 2.0×10^3 mL
D. 1.4×10^4 mL

(1) _____ 37. A student is given 0.325 g of $CaCl_2(s)$ and is instructed to make 25.0 mL of 0.100-mol/L $CaCl_2(aq)$ using all of the solid. The following materials are provided:

1. stirring rod	2. Bunsen burner	3. graduated cylinder
4. thermometer	5. 50-mL beaker	6. burette
7. hot plate	8. ring stand	9. $CaCl_2(s)$
10. distilled water	11. crucible	

Which list contains only the materials the student will need to produce the solution?

A. 1, 3, 5, 6, 9
B. 3, 4, 5, 9, 10
C. 1, 3, 5, 9, 10
D. 1, 5, 6, 9, 10

(1) _____ 38. A 3.00-mol/L sodium phosphate solution, $NaPO_4(aq)$, is used to make 250 mL of 0.50-mol/L sodium phosphate solution. It is determined that 42 mL of the concentrated solution is needed for the dilution. Steps that may be used to make the solution are as follows:

1. Insert a stopper into the volumetric flask.
2. Add distilled water to the volumetric flask until the 250-mL level is reached.
3. Add 42 mL of the sodium phosphate solution to 500 mL of distilled water.
4. Transfer 42 mL of the 3.00-mol/L solution into a 250-mL volumetric flask.
5. Heat the solid sodium phosphate to change it into a liquid.
6. Invert the volumetric flask to mix the contents.

Which steps, in the proper order, are required to produce the 0.50-mol/L sodium phosphate solution?

A. 3, 5, 2, 6
B. 4, 2, 1, 6
C. 2, 3, 4, 6, 5
D. 5, 2, 4, 1, 6

(1) _____ 39. The number of grams in three moles of solid ammonium chloride, $NH_4Cl(s)$, is

A. 50.47 g
B. 53.50 g
C. 102.96 g
D. 160.50 g

(1) _____ 40. A student dissolves 45.2 g of $Mg(OH)_2(s)$ in enough water to make 1.00 L of solution. The concentration of the solution is

A. 4.52 mol/L
B. 1.00 mol/L
C. 0.775 mol/L
D. 0.109 mol/L

(1) _____ 41. A teacher wants to make 200 mL of a 0.600-mol/L solution of KOH(aq). What volume of a 2.00-mol/L stock solution is required for this dilution?

A. 60.0 mL
B. 240 mL
C. 667 mL
D. 1.67×10^4 mL

42. Match each description with the appropriate term listed. Place your answer in the blank space given.

i. standard solution	ii. mole	iii. acid
iv. molar concentration	v. molar mass	vi. conversion factor

(½) _____ a. a specific amount of a substance that consists of 6.022×10^{23} particles

(½) _____ b. a fraction used to convert one set of units into another

(½) _____ c. the amount of solute, in moles, per litre of solution

(½) _____ d. a solution having a precisely known concentration

(½) _____ e. a substance that produces hydrogen ions when dissolved in water to form a conducting aqueous solution

(½) _____ f. the mass of one mole of a substance

43. Decide whether each statement is true (T) or false (F). Place your answer in the blank space given.

(½) _____ a. Percent by volume is commonly used for solids dissolved in liquids.

(½) _____ b. 70 mL of ethanol combined with 50 mL of water will give a combined volume that is less than 120 mL.

(½) _____ c. The term *parts per million* means "one part solvent for every million parts of solute."

(½) _____ d. Molar mass of a compound is the sum of the molar masses of the individual elements.

44. A 400-g sample of water contains 4.50×10^{-5} g of arsenic.

(3) a. Calculate the concentration of arsenic in the water sample in parts per million. Show your work.

(1) b. Use the table on page 42 of the textbook to determine whether this sample of water is safe to drink.

(4) 45. A technician measures 1.75 L of a standard solution of hydrochloric acid, HCl(aq), with a concentration of 9.00 mol/L. Determine the amount of water that must be added to create a solution with a concentration of 2.50 mol/L.

Submit your completed Assignment Booklet A1 to your teacher for assessment.
Then return to page 8 of the Distance Learning Student Guide,
and begin the Chapter 1 Summary.