2013 - 2014

Quarterly Science Benchmark Assessment (QSBA)

Chemistry

Second Quarter

Miami-Dade County Public Schools

Curriculum and Instruction

Division of Mathematics, Science, and Advanced Academic Programs

INTRODUCTION

The Chemistry Quarterly Science Benchmark Assessments (QSBA) were created with the objective of assessing student performance in order to improve the quality of student learning and enhance instructional practices by using data to make curricular decisions.

The Chemistry QSBAs are designed to be administered at the start of the school year, after each nine-week period (quarter) of instruction, and at the end of the school year, focusing its questions on the scientific content delineated by the Florida Department of Education (FLDOE) Next Generation Sunshine State Standards (NGSSS) and the specific benchmarks outlined by the Chemistry course description.

The Division of Mathematics, Science, and Advanced Academic Programs highly recommends the administration of the QSBAs to be concurrent with the administration of Baseline Assessments, Fall Interim Assessments, and Winter Interim Assessments.

The Pre-Test Assessment encompasses all the main concepts and ideas of the Chemistry course, while each Quarterly Assessment addresses the main benchmarks of each quarter specific to the Topics found in the Chemistry District Pacing Guide.

The NGSSS benchmarks pertinent to each course description have been grouped according to content and placement within the District Pacing Guides in order to facilitate the analysis of each assessment.

Teachers are encouraged to debrief the results of each of the QSBAs with students and use individual test results to focus on the benchmark(s) on which a student needs further instruction. This review will assist teachers in targeting their instruction.

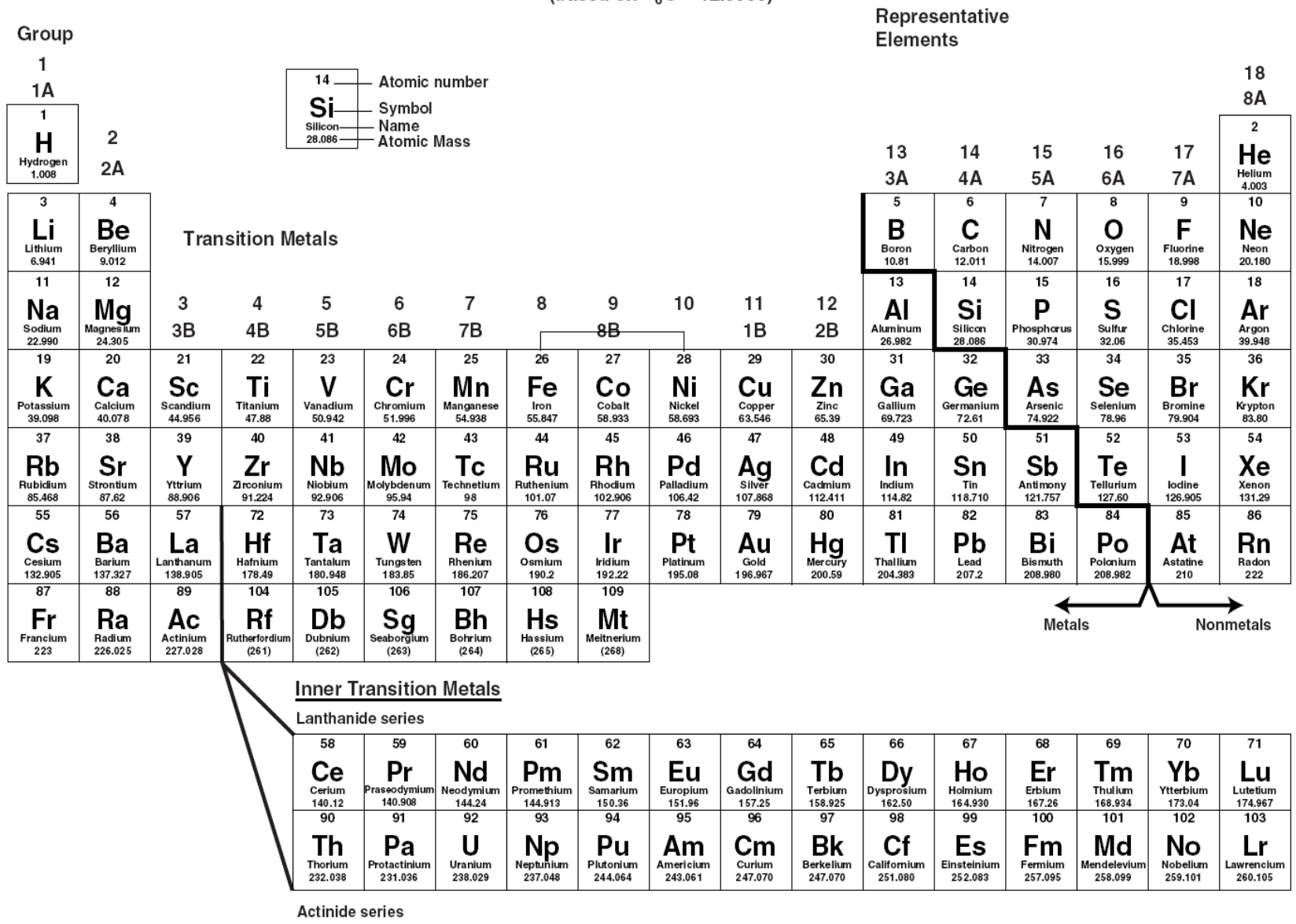
Teachers must use the Thinkgate Technology Platform (http://www.thinkgate.net/FLMiamiDadeSsplash/TGLogin.aspx) to print answer sheets, scan, score, and produce reports. This process will enable teachers to obtain student data in order to identify strengths and weaknesses and allow teachers to target instruction and monitor progress.

Additional information regarding the use of Thinkgate can be found in the Interim Assessment section of the department of Assessment, Research, and Data Analysis (http://oada.dadeschools.net/IAP/IAP.asp)

This document was created by the Division of Mathematics, Science and Advanced Academic Programs from District-developed questions and may include questions adapted from previously released tests with permission from the Massachusetts Department of Elementary and Secondary Education and the Pennsylvania Department of Education

Periodic Table of the Elements

(based on $^{12}_{6}C = 12.0000$)



Group	1 1A	2 2A	3 3B	4 4B	5 5B	6 6B	7 7B	8	9 8B	10	11 1B	12 2B	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1	1 H Hydrogen 1.008																	2 He Helium 4.003
2	3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
3	11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.453	18 Ar Argon 39.948
4	19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
5	37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.82	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
6	55 Cs Cesium 132.905	56 Ba Barium 137.327	57 La Lanthanum 138.905	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 208.982	85 At Astatine 210	86 Rn Radon 222
7	87 Fr Francium 223	88 Ra Radium 226.025	89 Ac Actinium 227.028	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (264)	108 Hs Hassium (265)	109 Mt Meitnerium (268)									

Inner Transition Metals														
Lanthanide series	58 Ce Cerium 140.12	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
Actinide series	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium 252.083	100 Fm Fermium 257.095	101 Md Mendelevium 258.099	102 No Nobelium 259.101	103 Lr Lawrencium 260.105

NAME:_____ **DATE:**_____

Read each question thoroughly and mark your responses on the answer sheet provided.

1. If the attractive forces among solid particles are less than the attractive forces between the solid and a liquid, the solid will?

   A. Begin the process of melting to form a liquid
   B. Probably form a new precipitate as its crystal lattice is broken and re-formed
   C. Particles will dissolve and be pulled away from the crystal lattice by the liquid molecules
   D. Will not be affected because attractive forces within the crystal lattice are too strong for the dissolution to occur

2. Which of these is an example of an exothermic chemical process?

   A. Evaporation of water
   B. Melting ice
   C. Photosynthesis of glucose
   D. Combustion of gasoline

3. How many moles of carbon-12 are contained in exactly 6 grams of carbon-12?

   A. 0.5 moles
   B. 2.0 moles
   C. 3.01×10^{23} moles
   D. 6.02×10^{23} moles

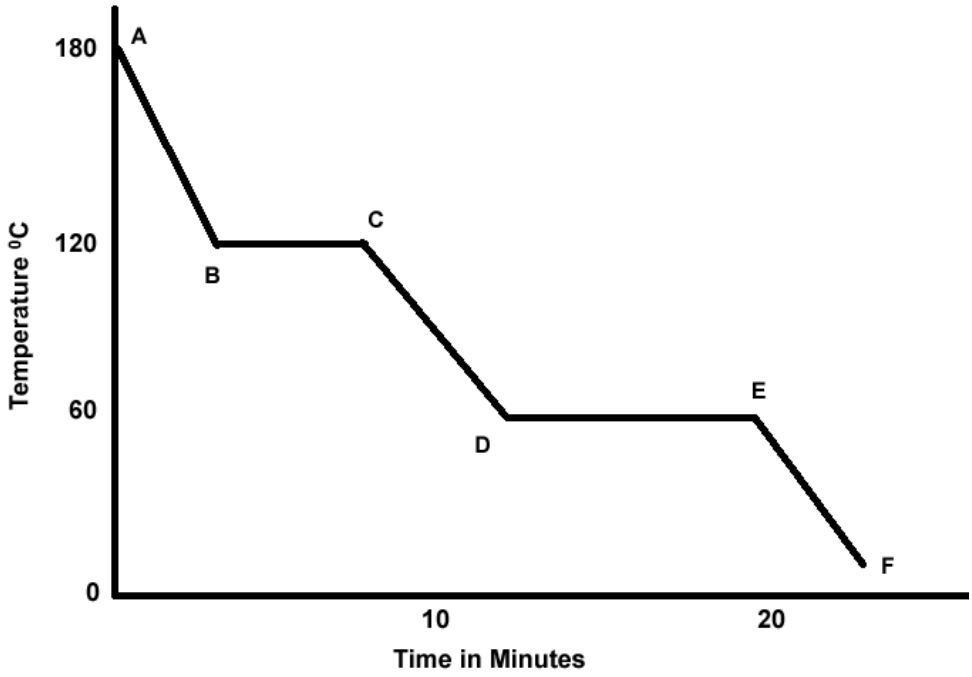
4. For a substance to change phases, the amount of internal energy must change. Water exists in three phases: liquid, solid, and gas. Which of the following lists the phases in order of increasing total energy?

   A. Gas, liquid, solid
   B. Solid, gas, liquid
   C. Liquid, gas, solid
   D. Solid, liquid, gas

5. Two elements in a molecule have the same electronegativity values. Which of the following most likely holds the element together and why?

   A. An ionic bond, because electrons transfer from one element to the other
   B. A nonpolar covalent bond, because the elements share electrons equally
   C. A polar covalent bond, because the elements do not share electrons equally
   D. An intermolecular force, because the elements do not form a chemical bond

6. The graph below represents a sample of a pure substance starting as a gas with uniform cooling.



Which of the following statements is correct about the phase and energy changes of the substance?

A. In segment $\overline{BC}$ the substance changes from a liquid to a solid and the potential energy increases.
B. In segment $\overline{CD}$ the substance changes from a liquid to a solid and the kinetic energy decreases
C. In segment $\overline{DE}$ the substance changes from a liquid to a solid and the kinetic energy decreases
D. In segment DE The substance changes from a liquid to a solid and the potential energy increases

7. Which type of compound has a high melting point, conducts electricity in the molten phase, and tends to be soluble in water?

A. ionic
B. metallic
C. covalent
D. molecular

8. What is the empirical formula for $C_4Br_2F_8$?

A. CBrF
B. C_2BrF_4
C. C_2BrF_6
D. $C_8Br_8F_8$

9. Which of the following equations represent the Law of Conservation of Mass?

   A. $H_2O \rightarrow H_2 + O_2$

   B. $2H + 2O \rightarrow 2H_2O$

   C. $2H_2O \rightarrow 2H_2 + O_2$

   D. $H_2 + O_2 \rightarrow H_2O + H_2O_2$

10. The name for NH_4F is?

   A. Ammonia fluoride
   B. Ammonium fluoride
   C. Ammonium fluorine
   D. Nitrogen tetrahydrogen fluoride

11. What is the mass of one mole of helium gas?

   A. 2 grams
   B. 4 grams
   C. 8 grams
   D. 22 grams

12. Clara carries a glass of ice water outside on a hot day. She sets it down and rushes inside to answer the phone. When she returns, the ice has melted. What is the best explanation for what happened to the drink?

   A. The warm air carried convection heat currents, which melted the ice molecules
   B. The ultraviolet rays from the Sun heated the molecules, decreasing their kinetic energy and increasing their attraction
   C. The ice molecules passed their cold energy to the water molecule, resulting in the liquid state
   D. The ice molecules absorbed energy from their surroundings, gained kinetic energy, and overcame the forces holding them in the solid state

13. Which of the following chemical equations is balanced correctly?

   A. $C_6H_6 + O_2 \rightarrow 2CO_2 + 3H_2O$

   B. $CS_2 + 3Cl_2 \rightarrow CCl_4 + S_2Cl_2$

   C. $B_2O_3 + 2C \rightarrow B_4C + CO$

   D. $Cl_2 + NaI \rightarrow 2NaCl + I_2$

14. What is the percentage of aluminum in aluminum oxide (Al_2O_3)

A. 47%
B. 48%
C. 53%
D. 54%

15. What is the completed balanced reaction for the replacement reaction Al + H_2SO_4?

A. $Al + H_2SO_4 \rightarrow AlSO_4 + H_2$

B. $Al + H_2SO_4 \rightarrow Al_2S_3 + H_2O$

C. $2\ Al + H_2SO_4 \rightarrow Al_2S_3 + 2O_2 + H_2$

D. $2\ Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$

16. Which is the correct formula for Iron (III) sulfate?

A. $Fe_3(SO_4)$
B. $FeSO_4$
C. $Fe_2(SO_4)_3$
D. $Fe_2(SO_3)_3$

17. How many grams of oxygen are required for the complete combustion of 4.00 grams of methane (CH_4) in the following equation?

$$\mathbf{CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O}$$

A. 4.00 g
B. 8.00 g
C. 16.0 g
D. 32.0 g

18. Which of the following is an intermolecular force?

A. Hydrogen bond
B. Covalent bond
C. Metallic bond
D. Ionic bond

19. Which of the following correctly pairs a phase of matter with its description?

A. Solid: particles have no motion
B. Liquid: Particles expand to fill any container in which they are placed
C. Gas: particles have higher amounts of energy than when in the liquid phase
D. Liquid: particles are more strongly attached to one another than when in the solid phase

20. During a series of experiments, a chemist found that a particular compound has the empirical formula of C_2H_5 and a molecular mass of 58.12 g/mol. What is the molecular formula of this compound?

    A. CH_4
    B. C_2H_5
    C. C_4H_{10}
    D. $C_{18}H_{40}$

21. Which of the following is the formula for ammonium hydroxide?

    A. Al_2O_3
    B. AmO_2
    C. NH_3OH
    D. NH_4OH

22. Chemical reactions occur around us every day. Combustion releases the carbon stored in fossil fuels (e.g. coal, oil, natural gases) into the atmosphere as carbon dioxide gas. Which of the following equations represent this process?

    A. $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$

    B. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$

    C. $CaCO_3 + HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$

    D. $NaHCO_3 + HC_2H_3O_2 \rightarrow NaC_2H_3O_2 + H_2O + CO_2$

23. Which type of reaction is represented by the following equation?

$$\mathbf{2KClO_3 \rightarrow 2KCl + 3O_2}$$

    A. synthesis
    B. decomposition
    C. single displacement
    D. double displacement

24. What type of reaction is represented by the figure below?

$$\mathbf{SO_3 + H_2SO_4 \rightarrow H_2S_2O_7}$$

    A. synthesis
    B. decomposition
    C. single displacement
    D. double displacement

25. Which of the following statements describes all exothermic reactions?

A. Exothermic reactions form gases
B. Exothermic reactions require a catalyst
C. The energy of the reactants is lower than the energy of the products
D. The energy of the reactants is higher than the energy of the products