# Ch. G11-Q2W2- Qs.Bank-Periodic properties of elelments

### **True/False**

Indicate whether the statement is true or false.

1. Iron, in an ionic form, is in the center of the hemoglobin molecule.

#### **Multiple Choice**

Identify the choice that best completes the statement or answers the question.

2. Which of the following is an alkaline earth metal? a. Sodium c. Iron b. Potassium d. Beryllium 3. What ions present in hard water interfere with the action of soaps and detergents, making it difficult to wash grease and oil from utensils and clothes? a. Calcium c. Potassium b. Sodium d. Hydrogen 4. Why does glass in welder's goggles contain neodymium and praseodymium? a. Neodymium and praseodymium add to the thickness of glass. b. Neodymium and praseodymium make glass more durable. c. Neodymium and praseodymium decrease the temperature of the glass and keep the surface of the goggles cool. d. Neodymium and praseodymium absorb high-energy radiation that can damage the eyes. 5. What is the trend in the melting point of d-block elements across a period? a. The melting point decreases from left to right. b. The melting point increases from left to right. c. The melting point remains the same. d. The melting point first increases and then decreases from left to right. 6. Where does the final electron enter in an inner transition metal? a. s sublevel c. p sublevel d. f sublevel b. d sublevel 7. At what sublevel does the final electron enter a transition metal? a. s sublevel c. d sublevel b. p sublevel d. f sublevel 8. Each row in the periodic table ends with a \_\_\_\_\_ a. metal c. metalloid b. nonmetal d. noble gas 9. Compared to the neutral atom from which it is derived, a negative ion is \_\_\_\_\_. a. always larger b. always smaller c. larger in some cases and smaller in others d. the same size 10. The valence configuration shared by carbon, silicon, and germanium is \_\_\_\_\_. c.  $s^2 p^2$ d.  $s^2 p^4$ a.  $1s^2 2s^2 2p^2$ b.  $2s^2 2p^6$ 11. When compared to the main group metals, transition metals have melting and boiling points that are \_\_\_\_\_. a. always lower c. about the same b. usually higher d. usually lower

 12.	Transition elements, such as chromium, are like	cely t	to have
	a. an oxidation number of 1+	c.	multiple oxidation numbers
	b. an oxidation number of 2+	d.	a negative oxidation number
 13.	The most important alloy of zinc contains cop	per a	ind is called
	a. steel	с.	brass
	b. zinc oxide	d.	slag
 14.	The atoms of an element in Group 2 are	ato	ms of a Group 13 element in the same period.
	a. larger than	c.	the same size as
	b. smaller than	d.	impossible to compare with
 15.	Active metals are in the region of the pe	eriod	lic table.
	a. <i>s</i>	c.	d
	b. <i>p</i>	d.	f
 16.	A metallic ion is its corresponding atom	n.	
	a. larger than	c.	the same size as
	b. smaller than	d.	impossible to compare with
 17.	Bromine is a typical nonmetal. A bromide ion	is	a bromine atom.
	a. larger than	c.	the same size as
	b. smaller than	d.	impossible to compare with
 18.	Ionic radii down a group in the periodic	c tabl	le.
	a. increase	c.	stay the same
	b. decrease	d.	follow no pattern
 19.	Alloys of magnesium are commonly used beca	ause	they are
	a. heavy and strong	c.	lightweight and strong
	b. strong and rigid	d.	reactive
 20.	Plants need the alkaline earth element i	n pho	otosynthesis.
	a. magnesium	c.	strontium
	b. calcium	d.	barium
 21.	Group 13 elements tend to form		11
	a. ionic compounds	C.	alloys
	b. covalent compounds	d.	metalloids
 22.	The most important use of lead is in		1
	a. solder	С. Л	batteries
•••	b. pewter	d.	paint pigment
 23.	In general, main group elements have n	neltıı	ng points and boiling points when compared with transition
	metals.	0	much lower
	a. Ingliei b. slightly lower	с. d	the same
24	Transition metals have multiple evidetion stat	u.	the same
 24.	chemical bonding	es de	cause of the involvement of the electrons in
	a s	C	d
	h n	d.	f
25	Because transition metals have similar atomic	radii	J
 25.	a similar	C	definitely different
	b. no	d.	identical
26	Because of its ability to bond with oxygen	 1	is an essential element in the hemoglobin in blood
 20.	a. tin	1	copper
	b. iron	d.	manganese
27	Which of the following elements is not in the	iron	triad?
 <i>_'</i> .	the following elements is not in the		

	a.	cobalt	c.	nickel
	b.	copper	d.	iron
 28.	The	e inner transition elements are found in the		_ block of the periodic table.
	a.	S	c.	d
	b.	p	d.	f

# Completion

Complete each statement.

- 29. When the nerve cell is stimulated, \_\_\_\_\_\_ ions flow into the cell.
- 30. The property of strong attraction of a substance to a magnetic field is called \_\_\_\_\_

#### Matching

Match each item with the correct statement below.

- a. alkali metal
- b. alkaline earth metal
- c. halogen
- \_\_\_\_\_ 31. Fluorine, bromine, or iodine
- \_\_\_\_\_ 32. An element found in Group 1 of the periodic table
- \_\_\_\_\_ 33. In compounds, has an oxidation number of 2+
- \_\_\_\_\_ 34. Sodium or cesium
- \_\_\_\_\_ 35. An element found in Group 17
- \_\_\_\_\_ 36. Magnesium or barium
- \_\_\_\_\_ 37. In compounds, has an oxidation number of 1+
- \_\_\_\_\_ 38. Is denser and harder than its alkali neighbor
- \_\_\_\_\_ 39. Strontium, which is identified by the red color of fireworks
- \_\_\_\_\_ 40. Astatine is the largest of this family

#### Short Answer

- 41. Define ionization energy.
- 42. Element 33 is in Group 15, Row 4 of the periodic table. Write the electron configuration for this element, and tell whether it is a metal, a nonmetal, or a metalloid.
- 43. Element 55 is in Group 1, Row 6 of the periodic table. Briefly describe the nature of the elements that have the atomic numbers 54 and 56.
- 44. How do the atoms of elements 19 and 35 compare in size?
- 45. How do the typical ions of elements 19 and 35 compare in size?
- 46. In what row and group is the element with electron configuration [Ar] $4s^23d^{10}4p^4$  found?

Choose the element from each of the following pairs that is more likely to react with the third element.

47. Calcium or magnesium to react with chlorine

- 48. Cesium or barium to react with fluorine
- 49. Iodine or astatine to react with aluminum
- 50. Oxygen or fluorine to react with magnesium
- 51. Rubidium or magnesium to react with sulfur

Tell where in the periodic table you would look for each of the following sets of elements.

- 52. All elements have a configuration that ends with  $ns^{1}$ .
- 53. All elements have 4f electrons but few or no 5d electrons.
- 54. All elements have configurations that end with 3s or 3p.
- 55. All elements have a configuration that ends with  $s^2p^5$ .
- 56. All elements have 5*f* electrons but few or no 6*d* electrons.

Tell why each of the following newspaper headlines would raise questions or objections in the mind of someone who had just completed a high school chemistry course.

- 57. "Chemists announce the discovery of element number 100."
- 58. "A ten-pound lump of potassium metal has been found floating on the Kissimmee River."
- 59. "Plants grown in soil free of bacteria are found to be healthier."
- 60. "First traces of silicon compounds are found in Earth's crust."
- 61. "Rusting of steel products is found to be caused by traces of chromium."
- 62. "Scientists look for ways of making a steel that is hard and strong."
- 63. "Calcium metal is suggested as a replacement for gold and silver in jewelry."
- 64. "Scientists discover the first practical uses for lanthanide elements."

The graph in Figure 8-1 shows the quantities of the top ten chemicals produced for the United States in 1994. Use this graph to answer some of these questions.



- 65. What nonmetal was produced in the largest quantity in 1994?
- 66. What metal was produced in the largest quantity in 1994?
- 67. What was the total quantity of nitrogen-containing substances in the top 10 chemicals produced in 1994?
- 68. Name one important use for the number 5 chemical on this list.
- 69. What is the total weight of organic (carbon-containing) compounds in the list of the top ten chemicals in 1994?
- 70. Explain why a Group 2 element is less reactive than a Group 1 element in the same period.

# **Ch. G11-Q2W2- Qs.Bank-Periodic properties of elelments Answer Section**

### **TRUE/FALSE**

# 1. ANS: T

Iron, in an ionic form, is in the center of the hemoglobin molecule.

PTS: 1 DIF: 1 REF: Page 286

OBJ: 8.2.2 Predict the chemical behavior of transition elements from their positions in the periodic table.

TOP: Predict the chemical behavior of transition elements from their positions in the periodic table.

KEY: Uses of transition metals MSC: 1

NOT: /T/ Correct! /F/ In an ionic form, iron is in the center of the hemoglobin molecule.

# MULTIPLE CHOICE

# 2. ANS: D

Beryllium is an alkaline earth metal.

	Feedback
Α	Sodium is an alkali metal.
В	Potassium is an alkali metal.
С	Iron is a transition element.
D	Correct!

PTS: 1 DIF: 1 REF: Page 265

OBJ: 8.1.2 Predict chemical behavior of the main group elements.

TOP: Predict chemical behavior of the main group elements. KEY: Alkaline earth metals MSC: 1

3. ANS: A

Calcium and magnesium ions present in hard water interfere with the action of soaps and detergents, and make it difficult to wash grease and oil from utensils and clothes.

	Feedback
Α	Correct!
В	Sodium ions are alkali metals that have only one valence electron, and are present as soluble salts in water.
С	Potassium ions are alkali metals that have only one valence electron, and are present as soluble salts in water. /c/ Hydrogen ions in hard water do not interfere with the action of soaps and detergents.
D	

PTS: 1 DIF: 1 REF: Page 265 | Page 268

OBJ: 8.1.2 Predict chemical behavior of the main group elements.

TOP: Predict chemical behavior of the main group elements. KEY: Alkaline earth metals MSC: 1

4. ANS: D

In welder's goggles, the glass contains neodymium and praseodymium which absorb high-energy radiation that can damage the eyes.

	Feedback
Α	Thickness of the goggles is increased by increasing the material of glass.
В	Neodymium and praseodymium are inner transition elements of the lanthanide series,
	which are not added to make the glass durable only.
С	Neodymium and praseodymium are not temperature stabilizers; they absorb only
	high-energy radiation.
D	Correct!

PTS: 1 DIF: 1 REF: Page 294

OBJ: 8.2.1 Relate the chemical and physical properties of the transition elements to their electron configurations.

TOP: Relate the chemical and physical properties of the transition elements to their electron configurations.

2

KEY: Inner transition metals MSC:

5. ANS: A

The melting point decreases from left to right across a period.

	Feedback
Α	Correct!
В	As the number of unpaired electrons increases across a period, the melting point decreases.
С	Melting point decreases with the decrease in number of unpaired electrons.
D	The d-block elements show a constant decrease in unpaired electrons across a period.

PTS: 1 DIF: 1 REF: Page 283

OBJ: 8.2.1 Relate the chemical and physical properties of the transition elements to their electron configurations.

TOP:Relate the chemical and physical properties of the transition elements to their electron configurations.KEY:Transition metalsMSC:1

6. ANS: D

In an inner transition metal the final electron enters the f sublevel.

	Feedback
Α	In alkali and alkaline earth metals, the final electron enters the s sublevel.
В	In p-block elements, the final electron enters the p sublevel.
С	In transition metals, the final electron enters the d sublevel.
D	Correct!

PTS: 1 DIF: 1 REF: Page 294

OBJ: 8.2.2 Predict the chemical behavior of transition elements from their positions in the periodic table.

TOP: Predict the chemical behavior of transition elements from their positions in the periodic table.

KEY: Inner transition metals MSC: 1

7. ANS: C

The final electron enters in the d sublevel a transition metal.

	Feedback
Α	In alkali and alkaline earth metals, the final electron enters at the s sublevel.
В	In p-block elements, the final electron enters the p sublevel.

	С	Correct!								
	D	In inner trans	ition elem	ents	, the final electror	n ente	rs the f sublevel.			
	PTS:	1	DIF:	1	REF:	Pag	e 283			
	OBJ:	8.2.2 Predic	et the chen	nical	behavior of trans	ition	elements from th	eir pos	sitions in	the periodic ta
	TOP:	Predict the	chemical l	beha	vior of transition	eleme	ents from their po	sitions	in the pe	eriodic table.
	KEY:	d-block ele	ments		MSC:	1				
8.	ANS:	D	PTS:	1	DIF:	В	OBJ:	8-1		
9.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-3		
10.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-1		
11.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-4		
12.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-4		
13.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-4		
14.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1		
15.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1		
16.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-3		
17.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-3		
18.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1		
19.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-1		
20.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-3		
21.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-3		
22.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-2		
23.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-4		
24.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-4		
25.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-5		
26.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-5		
27.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-5		
28.	ANS:	D	PTS:	1	DIF:	В	OBJ:	8-4		

# COMPLETION

29. ANS: sodium

	PTS:	1 DIF: 1 REF: Page 264
	OBJ:	8.1.2 Predict chemical behavior of the main group elements.
	TOP:	Predict chemical behavior of the main group elements. KEY: Alkali metals
	MSC:	2
30.	ANS:	ferromagnetism
	PTS:	1 DIF: 1 REF: Page 292
	OBJ:	8.2.2 Predict the chemical behavior of transition elements from their positions in the periodic table.
	TOP:	Predict the chemical behavior of transition elements from their positions in the periodic table.

KEY: Ferromagnetism MSC: 1

# MATCHING

31	ANS C	<b>ΡΤS</b> · 1	DIE B	OBI: 8-1
51.	ANS. C	F15. 1	$D\Pi^{-}$ , D	ODJ. 0-1

32.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1
33.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-1
34.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1
35.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-1
36.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-1
37.	ANS:	А	PTS:	1	DIF:	В	OBJ:	8-1
38.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-1
39.	ANS:	В	PTS:	1	DIF:	В	OBJ:	8-1
40.	ANS:	С	PTS:	1	DIF:	В	OBJ:	8-1

# SHORT ANSWER

41.	ANS: Ionization energy of an atom is defined as the energy required to remove an electron from a gaseous atom.								
42.	PTS: OBJ: TOP: KEY: ANS: The co	1 8.1.1 Relate th Relate the pos Ionization ene	DIF: ne posit sition of ergy [Ar]4s <sup>2</sup> .	1 ion of any main any main grou $3d^{10}4p^3$ ; it is a p	REF: n group p elemo MSC: metalloi	Page 263 element in the periodic table to its electron configuration. ent in the periodic table to its electron configuration. 1			
43.	PTS: ANS: Eleme	1 nt 54 is a noble	DIF: e gas; el	A ement 56 is an	OBJ: alkalin	8-1 e earth metal.			
44.	PTS: ANS: An ato	1 om of element 3	DIF: 35 is sm	A aller than an at	OBJ:	8-1 element 19.			
45.	PTS: ANS: An ior	1 n of element 35	DIF: is large	A er than an ion o	OBJ: f eleme	8-3 ent 19.			
46.	PTS: ANS: It is in	1 Row 4, Group	DIF: 16.	A	OBJ:	8-3			
47.	PTS: ANS: calcium	1 m	DIF:	A	OBJ:	8-1			
48.	PTS: ANS: cesiun	1 n	DIF:	В	OBJ:	8-2			
49.	PTS: ANS: iodine	1	DIF:	В	OBJ:	8-2			

50.	PTS: ANS: fluorin	1 ie	DIF:	В	OBJ:	8-2
51.	PTS: ANS: rubidiu	1 ım	DIF:	В	OBJ:	8-2
52.	PTS: ANS: Group	1	DIF:	В	OBJ:	8-2
53.	PTS: ANS: lanthai	1 nides	DIF:	В	OBJ:	8-1
54.	PTS: ANS: Row 4	1	DIF:	В	OBJ:	8-1
55.	PTS: ANS: Group	1 17	DIF:	В	OBJ:	8-1
56.	PTS: ANS: actinid	1 les	DIF:	В	OBJ:	8-1
57.	PTS: ANS: Eleme	1 nt 100 (fermiur	DIF: m) has	B already been di	OBJ: scovere	8-1 ed.
58.	PTS: ANS: Potass	1 ium would hav	DIF: e reacte	B ed with water in	OBJ: n the riv	8-1 ver.
59.	PTS: ANS: Bacter	1 ia are often nee	DIF: eded to	B convert nitroge	OBJ: en to a f	8-2 form that plants can utilize.
60.	PTS: ANS: Silicor	1 n compounds ha	DIF: ave lon	B g been known t	OBJ: to make	8-2 e up a large fraction of Earth's crust.
61.	PTS: ANS: Small	1 amounts of chr	DIF: romium	B in steel help pr	OBJ: revent c	8-2 corrosion, not cause it.
	PTS:	1	DIF:	А	OBJ:	8-4

62.	ANS: Many types of hard and strong steel already exist.								
63.	PTS:	1	DIF:	В	OBJ:	8-4			
	Jewelry metals need to be unreactive, and calcium is reactive.								
64.	PTS:	1	DIF:	В	OBJ:	8-2			
	Lanthanide elements already have many applications.								
65.	PTS:	1	DIF:	В	OBJ:	8-4			
	nitrog	nitrogen							
66.	PTS:	1	DIF:	В	OBJ:	8-2			
	unable to tell from this graph								
67.	PTS:	1	DIF:	В	OBJ:	8-2			
	47 billion kg								
68.	PTS:	1	DIF:	В	OBJ:	8-2			
	used in construction materials (as lime and its by-products)								
69.	PTS:	1	DIF:	В	OBJ:	8-2			
	35 billion kg								
70	PTS:	1	DIF:	В	OBJ:	8-2			
70.	Group 1 elements lose one electron when they react. Group 2 electrons then are as Group 1 elements in the second s								

Group 1 elements lose one electron when they react. Group 2 elements lose two. It's more difficult to lose two electrons than one, so Group 1 elements are more reactive.

PTS: 1 DIF: A OBJ: 8-2