

Name _____

Practice Exam: Paper 1

Topic 3: Periodicity

SL Score

/23

HL Score

/35

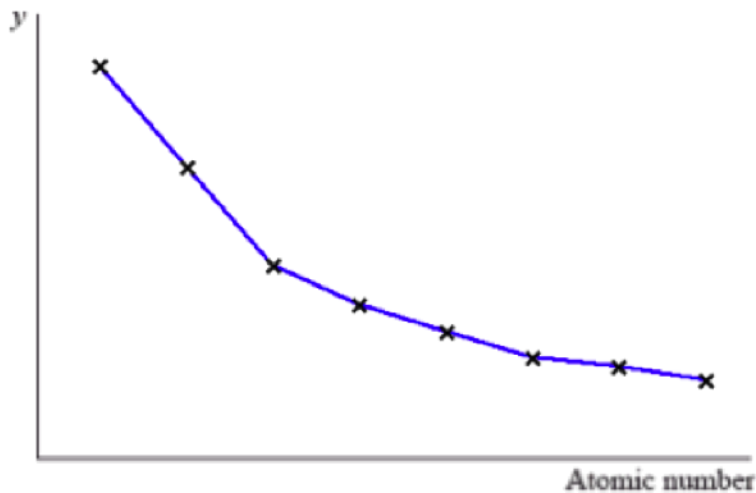
SL

- Which property generally **decreases** across period 3?
 - Atomic number
 - Electronegativity
 - Atomic radius
 - First ionization energy
- Which property **increases** down group 1?
 - First ionization energy
 - Melting point
 - Reactivity
 - Electronegativity
- Which statement about the elements in group 7 is correct?
 - Br_2 will oxidize Cl^- .
 - F_2 has the least tendency to be reduced.
 - Cl_2 will oxidize I^- .
 - I_2 is a stronger oxidizing agent than F_2 .
- Which change explains why the boiling points of the halogens increase as their molecular masses increase?
 - The intermolecular attraction due to temporarily induced dipoles increases.
 - The gravitational attraction between molecules increases.
 - The polarity of the bond within the molecule increases.
 - The strength of the bond within the molecule increases.

5. Which pair of elements has the greatest difference in electronegativity?
- A. Cs and F
 - B. Cs and Cl
 - C. Cs and Br
 - D. Cs and I
6. Which statements about the periodic table are correct?
- I. Elements in period 3 have similar chemical properties.
 - II. Elements in group 7 show a gradual change in physical properties.
 - III. The position of an element in period 3 is related to the number of electrons in the highest occupied energy level.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
7. Which statements about period 3 are correct?
- I. The electronegativity of the elements increases across period 3.
 - II. The atomic radii of the elements decreases across period 3.
 - III. The oxides of the elements change from acidic to basic across period 3.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
8. Which property **decreases** down group 7 in the periodic table?
- A. Melting point
 - B. Electronegativity
 - C. Atomic radius
 - D. Ionic radius

- 9 Which oxides produce an acidic solution when added to water?
- I. P_4O_{10}
 - II. MgO
 - III. SO_3
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
10. Which ion has the largest radius?
- A. Cl^-
 - B. K^+
 - C. Br^-
 - D. F^-
11. Which properties of the alkali metals decrease going down group 1?
- A. First ionization energy and reactivity
 - B. Melting point and atomic radius
 - C. Reactivity and electronegativity
 - D. First ionization energy and melting point
12. Which statements about the periodic table are correct?
- I. The elements Mg, Ca and Sr have similar chemical properties.
 - II. Elements in the same period have the same number of main energy levels.
 - III. The oxides of Na, Mg and P are basic.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

13. The x -axis of the graph below represents the atomic number of the elements in period 3.



Which variable could represent the y -axis?

- A. Melting point
 - B. Electronegativity
 - C. Ionic radius
 - D. Atomic radius
14. How many protons, neutrons and electrons are present in each atom of ^{31}P ?

	Protons	Neutrons	Electrons
A.	16	15	16
B.	15	16	15
C.	15	31	15
D.	16	31	16

15. An element is in group 4 and period 3 of the periodic table. How many electrons are in the highest occupied energy level of an atom of this element?
- A. 3
 - B. 4
 - C. 12
 - D. 14

16. Which is the best definition of *electronegativity*?
- A. Electronegativity is the energy required for a gaseous atom to gain an electron.
 - B. Electronegativity is the attraction of an atom for a bonding pair of electrons.
 - C. Electronegativity is the attraction between the nucleus and the valence electrons of an atom.
 - D. Electronegativity is the ability of an atom to attract electrons from another atom.
17. Which statement describes the trends of electronegativity values in the periodic table?
- A. Values increase from left to right across a period and increase down a group.
 - B. Values increase from left to right across a period and decrease down a group.
 - C. Values decrease from left to right across a period and increase down a group.
 - D. Values decrease from left to right across a period and decrease down a group.
18. Which statement is correct for all elements in the same period?
- A. They have the same number of electrons in the highest occupied energy level.
 - B. They have the same chemical reactivity.
 - C. They have the same number of occupied energy levels.
 - D. They have the same number of neutrons.
19. Which equation best represents the first ionization energy of magnesium?
- A. $\text{Mg(s)} \rightarrow \text{Mg}^{\text{+}}(\text{s}) + \text{e}^{-}$
 - B. $\text{Mg(g)} \rightarrow \text{Mg}^{2+}(\text{g}) + 2\text{e}^{-}$
 - C. $\text{Mg(g)} \rightarrow \text{Mg}^{\text{+}}(\text{g}) + \text{e}^{-}$
 - D. $\text{Mg(s)} \rightarrow \text{Mg}^{\text{+}}(\text{g}) + \text{e}^{-}$
20. What happens when sodium is added to water?
- I. A gas is evolved
 - II. The temperature of the water increases
 - III. A clear, colourless solution is formed
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

21. An atom of an element contains 19 electrons. In which group of the periodic table does it occur?

- A. 1
- B. 2
- C. 5
- D. 7

22. Which species has the largest radius?

- A. Cl^-
- B. K
- C. Na^+
- D. K^+

23. Which series is arranged in order of **increasing** radius?

- A. $\text{Ca}^{2+} < \text{Cl}^- < \text{K}^+$
- B. $\text{K}^+ < \text{Ca}^{2+} < \text{Cl}^-$
- C. $\text{Ca}^{2+} < \text{K}^+ < \text{Cl}^-$
- D. $\text{Cl}^- < \text{K}^+ < \text{Ca}^{2+}$

HL

1. Which electron transitions are responsible for the colours of transition metal compounds?
- A. Between d orbitals and s orbitals
 - B. Among the attached ligands
 - C. From the metal ion to the attached ligands
500. Between d orbitals
2. Ligands can form dative covalent bonds with metal ions to form complex ions. Which of the following can act as a ligand?
- I. Cl^-
 - II. NH_3
 - III. H_2O
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
3. Which metal nitrate solution is coloured?
- A. $\text{Zn}(\text{NO}_3)_2(\text{aq})$
 - B. $\text{Ni}(\text{NO}_3)_2(\text{aq})$
 - C. $\text{Mg}(\text{NO}_3)_2(\text{aq})$
 - D. $\text{Sc}(\text{NO}_3)_3(\text{aq})$
4. Which statements are correct for the complex ion $[\text{CuCl}_4]^{2-}$?
- I. The oxidation number of Cu in the complex ion is +2.
 - II. The coordination number of the copper ion is 4.
 - III. Chloride ions are behaving as ligands.
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

5. What is the ligand in the complex $K_3[Fe(CN)_6]$?
- CN^-
 - Fe^{3+}
 - K^+
 - $[Fe(CN)_6]^{3-}$
6. In which complexes does iron have an oxidation number of +3?
- $[Fe(H_2O)_6]^{3+}$
 - $[Fe(H_2O)_5(CN)]^{2+}$
 - $[Fe(CN)_6]^{3-}$
- I and II only
 - I and III only
 - II and III only
 - I, II and III

7. Which statements are correct for the reactions of Cl_2 , $MgCl_2$ and $SiCl_4$ with water?

	Cl_2	$MgCl_2$	$SiCl_4$
A.	forms a neutral solution	forms a neutral solution	no reaction
B.	forms an acidic solution	forms an acidic solution	forms an acidic solution
C.	forms an acidic solution	forms an acidic solution	no reaction
D.	forms a neutral solution	forms a neutral solution	forms an acidic solution

8. Which transition element, or compound of a transition element, is used as a catalyst in the Contact process?
- Fe
 - MnO_2
 - V_2O_5
 - Ni

9. What are the products of the reaction between chlorine and water?
- A. O_2 , H_2 and HCl
- B. H_2 and OCl_2
- C. HCl and $HOCl$
- D. $HOCl$, H_2 and Cl_2
10. Which process is responsible for the colour of a transition metal complex?
- A. The absorption of light when electrons move between s orbitals and d orbitals
- B. The emission of light when electrons move between s orbitals and d orbitals
- C. The absorption of light when electrons move between different d orbitals
- D. The emission of light when electrons move between different d orbitals
11. Which salts form coloured solutions when dissolved in water?
- I. $FeCl_3$
- II. $NiCl_2$
- III. $ZnCl_2$
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III
12. Which combination is correct for the complex ion in $[Co(NH_3)_4(H_2O)Cl]Br$?

	Oxidation state of cobalt	Shape of the complex ion	Overall charge of the complex ion
A.	+2	Octahedral	+2
B.	+3	Octahedral	-1
C.	+2	Octahedral	+1
D.	+2	Tetrahedral	+1

