

Name: \_\_\_\_\_

Student number: \_\_\_\_\_

Chemistry 1E03

Term Test

Oct. 24, 2014

**McMaster University**

**VERSION 1**

Instructors: Drs. R.S. Dumont & P. Kruse

Duration: 120 minutes

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This test contains 18 numbered pages printed on both sides. There are **30** multiple-choice questions appearing on pages numbered 3 to 14. Pages 15 and 16 provide extra space for rough work. Page 17 includes some useful data and equations, and there is a periodic table on page 18. You may tear off the last pages to view the periodic table and the data provided.

**You must enter your name and student number on this question sheet, as well as on the answer sheet.** Your invigilator will be checking your student card for identification.

**You are responsible** for ensuring that your copy of the question paper is complete. Bring any discrepancy to the attention of your invigilator.

All questions are worth 1 mark; the total marks available are 30. There is **no** additional penalty for incorrect answers.

**BE SURE TO ENTER THE CORRECT VERSION NUMBER OF YOUR TEST (shown near the top of page 1), IN THE SPACE PROVIDED ON THE ANSWER SHEET.**

**ANSWER ALL QUESTIONS ON THE ANSWER SHEET, IN PENCIL.**

Instructions for entering multiple-choice answers are given on page 2.

**SELECT ONE AND ONLY ONE ANSWER FOR EACH QUESTION** from the answers (A) through (E). **No work written on the question sheets will be marked.** The question sheets may be collected and reviewed in cases of suspected academic dishonesty.

Academic dishonesty may include, among other actions, communication of any kind (verbal, visual, *etc.*) between students, sharing of materials between students, copying or looking at other students' work. If you have a problem please ask the invigilator to deal with it for you. Do not make contact with other students directly. Try to keep your eyes on your own paper – looking around the room may be interpreted as an attempt to copy.

Only Casio FX 991 electronic calculators may be used; but they must **NOT** be transferred between students. Use of periodic tables or any aids, other than those provided, is not allowed.

Name: \_\_\_\_\_

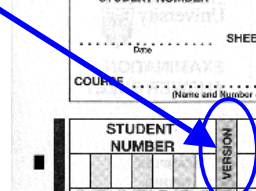
Student number: \_\_\_\_\_


**OMR EXAMINATION – STUDENT INSTRUCTIONS**

**NOTE: IT IS YOUR RESPONSIBILITY TO ENSURE THAT THE ANSWER SHEET IS PROPERLY COMPLETED: YOUR EXAMINATION RESULT DEPENDS UPON PROPER ATTENTION TO THESE INSTRUCTIONS.**

The scanner, which reads the sheets, senses the bubble shaded areas by their non-reflection of light. A heavy mark must be made, completely filling the circular bubble, with an HB pencil. Marks made with a pen will **NOT** be sensed. Erasures must be thorough or the scanner will still sense a mark. Do **NOT** use correction fluid on the sheets. Do **NOT** put any unnecessary marks or writing on the sheet.

1. On **SIDE 1 (red side)** of the form, in the top box, *in pen*, print your student number, name, course name, and the date in the spaces provided. Then you **MUST** write your signature, in the space marked SIGNATURE.
2. In the second box, *with a pencil*, mark your student number, **exam version number** in the space provided and fill in the corresponding bubble numbers underneath.
3. Answers: mark only **ONE** choice from the alternatives (A,B,C,D,E) provided for each question. The question number is to the left of the bubbles. Make sure that the number of the question on the scan sheet is the same as the number on the test paper.
4. Pay particular attention to the Marking+ Directions on the form.
5. Begin answering the question using the first set of bubbles, marked "1".



|   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| STUDENT NUMBER  |  |  |  |  |  |  |  |  |  | NAME _____<br>(Surname) _____ (Given Name) _____ |  |  |  |  |  |  |  |  |  | <br><b>EXAMINATION ANSWER SHEET</b> |  |  |  |  |  |  |  |  |  |
| SHEET # _____ OF _____                                |  |  |  |  |  |  |  |  |  | SIGNATURE _____<br>(in pen)                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| COURSE _____<br>(Name and Number - e.g. ENGLISH 1A06) |  |  |  |  |  |  |  |  |  | SECTION _____<br>(e.g. 01, 02, 03)               |  |  |  |  |  |  |  |  |  | INSTRUCTOR'S NAME _____  |  |  |  |  |  |  |  |  |  |

| STUDENT NUMBER |     | VERSION | SECTION NO. | SEAT NUMBER |   |   |
|----------------|-----|---------|-------------|-------------|---|---|
| ROOM           | ROW | SEAT    |             |             |   |   |
| 0              | 0   | 0       | 0           | 0           | 0 | 0 |
| 1              | 1   | 1       | 1           | 1           | 1 | 1 |
| 2              | 2   | 2       | 2           | 2           | 2 | 2 |
| 3              | 3   | 3       | 3           | 3           | 3 | 3 |
| 4              | 4   | 4       | 4           | 4           | 4 | 4 |
| 5              | 5   | 5       | 5           | 5           | 5 | 5 |
| 6              | 6   | 6       | 6           | 6           | 6 | 6 |
| 7              | 7   | 7       | 7           | 7           | 7 | 7 |
| 8              | 8   | 8       | 8           | 8           | 8 | 8 |
| 9              | 9   | 9       | 9           | 9           | 9 | 9 |

| MARKING DIRECTIONS  | EXAMPLES                    |
|---|-----------------------------|
| • Use HB black lead pencil only.                          | <b>WRONG</b><br>1 1 1 1 1 1 |
| • Do not use ink or ballpoint pens.                       | <b>WRONG</b><br>2 1 2 1 2 1 |
| • Make heavy black marks that fill the circle completely. | <b>WRONG</b><br>3 1 3 1 3 1 |
| • Erase cleanly any answer you wish to change.            | <b>RIGHT</b><br>4 1 2 3 4 5 |
| • Make no stray marks on the answer sheet.                |                             |

**SIDE 1**

|    |   |   |   |   |   |   |   |    |   |   |   |   |   |   |   |
|----|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|
| 1  | T | F | A | B | C | D | E | 26 | T | F | A | B | C | D | E |
| 2  | T | F | A | B | C | D | E | 27 | T | F | A | B | C | D | E |
| 3  | T | F | A | B | C | D | E | 28 | T | F | A | B | C | D | E |
| 4  | T | F | A | B | C | D | E | 29 | T | F | A | B | C | D | E |
| 5  | T | F | A | B | C | D | E | 30 | T | F | A | B | C | D | E |
| 6  | T | F | A | B | C | D | E | 31 | T | F | A | B | C | D | E |
| 7  | T | F | A | B | C | D | E | 32 | T | F | A | B | C | D | E |
| 8  | T | F | A | B | C | D | E | 33 | T | F | A | B | C | D | E |
| 9  | T | F | A | B | C | D | E | 34 | T | F | A | B | C | D | E |
| 10 | T | F | A | B | C | D | E | 35 | T | F | A | B | C | D | E |
| 11 | T | F | A | B | C | D | E | 36 | T | F | A | B | C | D | E |
| 12 | T | F | A | B | C | D | E | 37 | T | F | A | B | C | D | E |
| 13 | T | F | A | B | C | D | E | 38 | T | F | A | B | C | D | E |
| 14 | T | F | A | B | C | D | E | 39 | T | F | A | B | C | D | E |
| 15 | T | F | A | B | C | D | E | 40 | T | F | A | B | C | D | E |
| 16 | T | F | A | B | C | D | E | 41 | T | F | A | B | C | D | E |
| 17 | T | F | A | B | C | D | E | 42 | T | F | A | B | C | D | E |
| 18 | T | F | A | B | C | D | E | 43 | T | F | A | B | C | D | E |
| 19 | T | F | A | B | C | D | E | 44 | T | F | A | B | C | D | E |
| 20 | T | F | A | B | C | D | E | 45 | T | F | A | B | C | D | E |
| 21 | T | F | A | B | C | D | E | 46 | T | F | A | B | C | D | E |
| 22 | T | F | A | B | C | D | E | 47 | T | F | A | B | C | D | E |
| 23 | T | F | A | B | C | D | E | 48 | T | F | A | B | C | D | E |
| 24 | T | F | A | B | C | D | E | 49 | T | F | A | B | C | D | E |
| 25 | T | F | A | B | C | D | E | 50 | T | F | A | B | C | D | E |

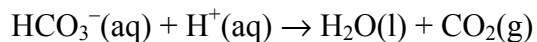
1. For the following pure substances, identify the one **incorrect** chemical name from among the following:

- A)  $\text{Li}_2\text{CO}_3$ , lithium carbonate  
B)  $\text{Fe}_2\text{O}_3$ , iron(III) oxide  
C)  $\text{HF}$ , hydrogen fluoride  
D)  $\text{Ca}(\text{H}_2\text{PO}_4)_2$ , calcium dihydrogen phosphate  
E)  $\text{NH}_4\text{ClO}_2$ , ammonium chlorate

2. The cation  $^{27}\text{Al}^{3+}$  contains

- A) 13 neutrons, 14 protons, 11 electrons  
B) 17 neutrons, 10 protons, 13 electrons  
C) 14 neutrons, 13 protons, 10 electrons  
D) 13 neutrons, 13 protons, 13 electrons  
E) 27 neutrons, 13 protons, 12 electrons

3. The percentage by mass of hydrogen carbonate in a certain antacid is 35.0 %. Calculate the **volume** of carbon dioxide gas (in mL) generated at  $37^\circ\text{C}$  and 1.00 bar pressure, when a person ingests a 3.30 g tablet. The reaction in the stomach is:



- A) 623  
B) 21.6  
C) 972  
D) 79.1  
E) 488

4. Aluminum displaces platinum from a platinum chloride compound. The *unbalanced* reaction is  $\text{Al(s)} + \text{PtCl}_x(\text{aq}) \rightarrow \text{AlCl}_3(\text{aq}) + \text{Pt(s)}$ . A 1.02 g sample of platinum chloride is dissolved in water and reacted with an excess of aluminum to give 0.59 g of platinum metal (atomic number 78). What is the **empirical formula** of the platinum chloride?

- .  
A)  $\text{PtCl}$   
B)  $\text{PtCl}_2$   
C)  $\text{PtCl}_4$   
D)  $\text{PtCl}_5$   
E)  $\text{PtCl}_3$

5. Choose the one **false** statement from the following:

- .  
A) The volume of an ideal gas, at a given temperature and pressure, is directly proportional to the number of moles of the gas.  
B) The density of an ideal gas is proportional to its molar mass.  
C) Pressure is defined as force per unit area.  
D) The pressure of a fixed volume of an ideal gas is directly proportional to the temperature of the gas.  
E) All ideal gases have the same density.

6. Which one of the following atoms has **more** than one **unpaired** electron in its **ground-state** electron configuration?

- .  
A) Al  
B) P  
C) Xe  
D) Sr  
E) F

7. The minimum frequency of light needed for the photoelectric effect of a particular metal is  $4.00 \times 10^{14}$  Hz ( $1 \text{ Hz} = 1 \text{ s}^{-1}$ ). What is the **kinetic energy** (in J) of an electron ejected by a photon with frequency,  $12.00 \times 10^{14}$  Hz?

A)  $4.00 \times 10^{14}$   
B)  $1.98 \times 10^{-18}$   
C)  $2.34 \times 10^{-19}$   
D)  $4.89 \times 10^{-18}$   
E)  $5.30 \times 10^{-19}$

8. An arsenic atom ( $Z = 33$ ) is in its **ground state**. Which one of the following sets of quantum numbers ( $n, l, m_l, m_s$ ) could **not** possibly describe one of its electrons?

A) 4, 2, 2,  $-1/2$   
B) 2, 1, -1,  $1/2$   
C) 3, 0, 0,  $-1/2$   
D) 3, 2, -2,  $1/2$   
E) 4, 1, 0,  $1/2$

9. A sample of hydrogen atoms have their electrons excited to various energy levels. This is followed by emission of light. Which one of the following emission transitions produces a photon with the **shortest wavelength**?

A)  $n = 7 \rightarrow n = 6$   
B)  $n = 7 \rightarrow n = 1$   
C)  $n = 3 \rightarrow n = 2$   
D)  $n = 2 \rightarrow n = 1$   
E)  $n = 5 \rightarrow n = 2$

10. Which one of the following electron configurations is **not** a **ground-state** configuration of any neutral atom?

- A)  $[\text{Kr}]4d^{10}5s^2$
- B)  $[\text{Ar}]4s^1$
- C)  $[\text{Ne}]3s^23p^4$
- D)  $[\text{Ne}]3s^23p^63d^2$
- E)  $[\text{Ar}]3d^24s^2$

11. Select the **correct** sequence of the elements Al, K, Mg and N in order of **decreasing** atomic size:

- A)  $\text{K} > \text{N} > \text{Mg} > \text{Al}$
- B)  $\text{K} > \text{Al} > \text{N} > \text{Mg}$
- C)  $\text{K} > \text{Al} > \text{Mg} > \text{N}$
- D)  $\text{K} > \text{Mg} > \text{Al} > \text{N}$
- E)  $\text{Al} > \text{Mg} > \text{K} > \text{N}$

12. Which of the following statements are **TRUE**?

- (i) Br atoms are smaller than As atoms.
- (ii) N has a lower first ionization energy than C.
- (iii) Li has a higher electron affinity than O.
- (iv) Ba is easier to ionize than Sr.
- (v)  $\text{Cl}^-$  is a larger ion than  $\text{Ca}^{2+}$ .

- A) i, ii, iv
- B) i, iii, v
- C) i, iv, v
- D) ii, iii, v
- E) all

13. Which one of the following atoms has the **largest** first ionization energy? (Hint: consider the ground state electron configurations for these atoms.)

A) S  
B) P  
C) K  
D) Si  
E) Al

14. Identify the **FALSE** statement(s):

(i) Lithium fluoride contains larger ions than potassium iodide.  
(ii) Magnesium has a larger atomic radius than sodium.  
(iii) For some elements, the 2<sup>nd</sup> ionization energy ( $M^+ \rightarrow M^{2+} + e^-$ ) is smaller than the 1<sup>st</sup> ionization energy ( $M \rightarrow M^+ + e^-$ ).

A) iii  
B) i, ii, iii  
C) i  
D) i, iii  
E) ii, iii

15. Which is the **correct** ordering of electronegativities for the atoms Mg, Ba, O, P?

A)  $Mg < Ba < P < O$   
B)  $Ba < P < O < Mg$   
C)  $O < Mg < Ba < P$   
D)  $Ba < Mg < P < O$   
E)  $P < O < Mg < Ba$

16. For the species  $\text{NO}^+$ ,  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ , what is the correct order of **decreasing N-O bond length**?

- A)  $\text{NO}_2^- > \text{NO}_3^- > \text{NO}^+$
- B)  $\text{NO}_3^- > \text{NO}^+ > \text{NO}_2^-$
- C)  $\text{NO}_3^- > \text{NO}_2^- > \text{NO}^+$
- D)  $\text{NO}^+ > \text{NO}_2^- > \text{NO}_3^-$
- E)  $\text{NO}_2^- > \text{NO}^+ > \text{NO}_3^-$

17. Rank the molecules  $\text{PF}_5$ ,  $\text{PF}_3$  and  $\text{PH}_3$ , in order of **increasing molecular dipole moment**? (Electronegativity values: P = 2.1; H = 2.2; F = 4.0)

- A)  $\text{PH}_3 < \text{PF}_5 < \text{PF}_3$
- B)  $\text{PF}_3 < \text{PF}_5 < \text{PH}_3$
- C)  $\text{PF}_5 < \text{PH}_3 < \text{PF}_3$
- D)  $\text{PF}_5 < \text{PF}_3 < \text{PH}_3$
- E)  $\text{PH}_3 < \text{PF}_3 < \text{PF}_5$



18. Choose the **true** statement concerning nitrosyl chloride, ONCl (N is the central atom):

- A) The molecule contains 5 nonbonding electron pairs.
- B) The molecule is linear.
- C) All formal charges can be minimized to zero.
- D) The molecule contains 4 bonding electron pairs.
- E) None of the above statements are true.

19. What is the average **bond order** of the iodine-oxygen bond in  $\text{IO}_3^-$ ?

- A) 1
- B)  $5/3$
- C) 2
- D)  $3/2$
- E)  $4/3$

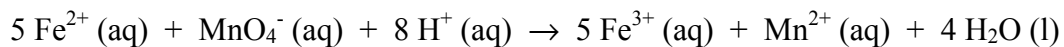
20. What is the geometry around the carbon atom of the formate anion,  $\text{HCO}_2^-$  (H is bonded to the central atom, carbon)?

- .  
A) T-shaped  
B) tetrahedral  
C) triangular pyramidal  
D) triangular planar  
E) linear

21. An unknown aqueous solution contains either  $\text{KNO}_3$  or  $\text{K}_3\text{PO}_4$ . Addition of which **one** of the following aqueous solutions provides a simple **visual test** that identifies the unknown?

- .  
A)  $\text{Na}_2\text{SO}_4$   
B)  $\text{LiBr}$   
C)  $\text{NaCl}$   
D)  $\text{RbOH}$   
E)  $\text{CaBr}_2$

22. Identify the reducing agent in the following reaction.



- .  
A)  $\text{MnO}_4^-$   
B)  $\text{H}^+$   
C)  $\text{Fe}^{3+}$   
D)  $\text{Fe}^{2+}$   
E)  $\text{Mn}^{2+}$

23. Select the **TRUE** statement, below, regarding the following three reactions:

- (i)  $\text{Cd(s)} + \text{NiO}_2\text{(s)} + 2 \text{H}_2\text{O(l)} \rightarrow \text{Cd(OH)}_2\text{(s)} + \text{Ni(OH)}_2\text{(s)}$
- (ii)  $2 \text{MnO}_4^-\text{(aq)} + 5 \text{H}_2\text{SO}_3\text{(aq)} \rightarrow 2 \text{Mn}^{2+} + 5 \text{SO}_4^{2-}\text{(aq)} + 4 \text{H}^+\text{(aq)} + 3 \text{H}_2\text{O(l)}$
- (iii)  $\text{KH}_2\text{PO}_4\text{(aq)} + \text{KOH(aq)} \rightarrow \text{H}_2\text{O(l)} + \text{K}_2\text{HPO}_4$

- A) In reaction (iii),  $\text{H}_2\text{PO}_4^-$  is acting as a Brønsted base.
- B) In reaction (ii), sulfurous acid is reduced.
- C) In reaction (i),  $\text{NiO}_2$  is the reducing agent.
- D) In reaction (iii),  $\text{OH}^-$  is the conjugate acid of  $\text{H}_2\text{PO}_4^-$ .
- E) In reaction (i),  $\text{Cd(s)}$  is oxidized.

24. Regarding the chemical reactions (i,ii,iii), identify the **false** statement below.

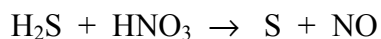
- (i)  $\text{LiOH(s)} + \text{HOCl(aq)} \rightarrow \text{LiOCl(aq)} + \text{H}_2\text{O(l)}$
- (ii)  $\text{C(s)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)}$
- (iii)  $\text{KHSO}_4\text{(aq)} + \text{NaCH}_3\text{COO(aq)} \rightarrow \text{KNaSO}_4\text{(aq)} + \text{CH}_3\text{COOH(aq)}$

- A)  $\text{SO}_4^{2-}\text{(aq)}$  is a spectator ion in reaction (iii).
- B)  $\text{CH}_3\text{COO}^-$  acts as a base in reaction (iii).
- C)  $\text{HOCl}$  acts as an acid in reaction (i).
- D) Four electrons are transferred in reaction (ii).
- E) Reaction (ii) is an oxidation reduction.

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25. Complete and balance the following redox equation in acidic solution. What is the **coefficient of S**, when the reaction is balanced with smallest whole number coefficients.

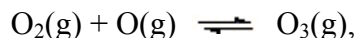


- .  
A) 2  
B) 3  
C) 6  
D) 1  
E) 4

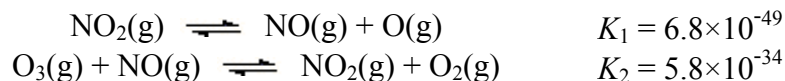
26. In the event of an uncontrollable fire in the lab, the **safest** course of action for a student is:

- .  
A) Find the Laboratory Coordinator  
B) Exit the lab and wait in the hallway until safe to return  
C) Exit the laboratory and building, pulling the fire alarm while exiting the building  
D) Collect all personal items and exit the building  
E) Attempt to extinguish the fire

27. Determine the **equilibrium constant** for the formation of ozone,



from the following data:



- A)  $5.6 \times 10^{83}$   
B)  $8.1 \times 10^{-81}$   
C)  $3.7 \times 10^{-82}$   
D)  $2.5 \times 10^{81}$   
E)  $1.9 \times 10^{82}$

28. The equilibrium constant for the reaction  $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{NO}(\text{g})$  is  $1.7 \times 10^{-1}$  at an elevated temperature. A reaction vessel at this temperature contains  $\text{N}_2(\text{g})$  at a partial pressure of 0.25 bar,  $\text{O}_2(\text{g})$  at a partial pressure of 0.25 bar, and  $\text{NO}(\text{g})$  at a partial pressure of  $4.2 \times 10^{-1}$  bar. Select the one **true** statement for this system.

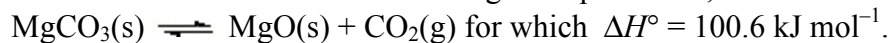
- A) The reaction quotient  $Q$  is smaller than  $K$ , and there is net forward reaction.  
B) The reaction quotient  $Q$  is smaller than  $K$ , and there is net reverse reaction.  
C) The reaction quotient  $Q$  is larger than  $K$ , and there is net forward reaction.  
D) The reaction quotient  $Q$  is larger than  $K$ , and there is net reverse reaction.  
E) The system is at equilibrium.

29. In the cycles of copper lab, a student obtains a yield of 105% copper in the final step. Which of the following provide **possible explanations** for this result?

- (i) There is unreacted metallic zinc mixed in with the copper.
- (ii) The copper product is not completely dry.
- (iii) The student added too much HCl(aq).

- A) None. There is nothing unusual about a yield of 105%
- B) i, ii and iii
- C) i and ii
- D) i and iii
- E) ii and iii

30. Select the one **false** statement concerning the equilibrium,



- A) Removing  $\text{CO}_2(\text{g})$  increases the amount of  $\text{MgO}(\text{s})$ .
- B) Halving the size of the reaction vessel increases the amount of  $\text{MgCO}_3(\text{s})$ .
- C) Adding  $\text{MgO}(\text{s})$  does not change the amount of  $\text{MgCO}_3(\text{s})$ .
- D) Increasing the temperature increases the amount of  $\text{MgO}(\text{s})$ .
- E) Doubling the amount of all three species (with the volume of the reaction vessel fixed) has no effect on the equilibrium.

Name: \_\_\_\_\_

Student number: \_\_\_\_\_

**Extra space for rough work:**

Name: \_\_\_\_\_

Student number: \_\_\_\_\_

**Extra space for rough work:**



Name: \_\_\_\_\_

Student number: \_\_\_\_\_

- Some general data are provided on this page.
- A Periodic Table with atomic weights is provided on the next page.

$$R = 8.3145 \text{ J K}^{-1} \text{ mol}^{-1} = 0.08206 \text{ L atm K}^{-1} \text{ mol}^{-1} = 0.083145 \text{ L bar K}^{-1} \text{ mol}^{-1}$$

$$N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$c = 2.9979 \times 10^8 \text{ m s}^{-1}$$

$$h = 6.6256 \times 10^{-34} \text{ Js}$$

$$m_e = 9.10 \times 10^{-31} \text{ kg}$$

$$1 \text{ bar} = 100.0 \text{ kPa}$$

$$0^\circ\text{C} = 273.15 \text{ K}$$

$$1 \text{ J} = 1 \text{ kg m}^2 \text{ s}^{-2} = 1 \text{ kPa L} = 1 \text{ Pa m}^3$$

$$1 \text{ m} = 10^9 \text{ nm} = 10^{10} \text{ \AA}$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$1 \text{ g} = 10^3 \text{ mg}$$

$$1 \text{ Hz} = 1 \text{ cycle/s}$$

De Broglie wavelength:

Hydrogen atom energy levels:

$$\lambda = h / mv = h / p$$

$$E_n = -R_H / n^2 = -2.178 \times 10^{-18} \text{ J} / n^2$$

### Solubility Guidelines for Common Ionic Solids

1. Alkali metal and ammonium salts are *soluble*.
2. Nitrate, chlorate, perchlorate, hydrogen carbonate and ethanoate salts are *soluble*.
3. Sulfate salts are *soluble*, *except* for the calcium, strontium and barium salts which are *insoluble*.
4. Chloride, bromide and iodide salts are *soluble*, *except* for the silver, lead and mercury I salts which are *insoluble*.
5. Silver, lead and mercury I salts are *insoluble*, unless deemed soluble by rule 2 or 3.
6. Sulfide salts are *insoluble*, *except* for the alkali metal, ammonium, and alkaline earth salts which are *soluble*.
7. Oxide and hydroxide salts are *insoluble*, *except* for the alkali metal, ammonium, calcium, strontium and barium salts which are *soluble*.
8. Carbonate and phosphate are *insoluble*, *except* for the alkali metal and ammonium salts.

Name: \_\_\_\_\_

Student number: \_\_\_\_\_