

اسم الطالب:

اسم المادة:



وزارة التعليم العالي والبحث العلمي  
جامعة تكريت - كلية العلوم - قسم الكيمياء  
الدراسات العليا



كلية العلوم - قسم الكيمياء  
طلبة الدكتوراه للعام الدراسي 2017-2018

الرقم  
السري

الرقم السري

الامتحان النهائي لطلبة الدكتوراه للعام الدراسي 2017-2018  
الكيمياء الفيزيائية المتقدم-الفصل الأول - الدور الأول

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المجموع الكلي				



**Q1: Choose the correct answer of the following:**

1. In an adiabatic process ----- can flow into or out of the system.
  - a. no heat
  - b. heat
  - c. matter
  - d. no matter
2. An isobaric process takes place at constant -----
  - a. temperature
  - b. pressure
  - c. volume
  - d. concentration
3. For a cyclic process, the change in internal energy of the system is
  - a. always positive
  - b. always negative
  - c. equal to zero
  - d. equal to infinity
4. A gas expands from 10 litres to 20 litres against a constant external pressure of 10 atm. The pressure volume work done by the system is
  - a. 100 lit atm
  - b. -100 lit atm
  - c. 10 lit atm
  - d. -10 lit atm
5. The amount of heat required to raise the temperature of one mole of the substance by 1 K is called
  - a. heat capacity
  - b. molar heat capacity
  - c. molar heat
  - d. molar capacity
6. The work done when 1 mole of a gas expands reversibly and isothermally from 5 atm to 1 atm at 300 K is
  - a. - 4015 J
  - b. +4015 J
  - c. zero
  - d. 150 J

7. For one mole of a gas, the ideal gas equation is
- $PV = RT$
  - $PV = 1/2 RT$
  - $PV = 3/2 RT$
  - $PV = 5/2 RT$
8. The units of R, the gas constant are
- $\text{erg K}^{-1} \text{mol}^{-1}$
  - $\text{cal K}^{-1} \text{mol}^{-1}$
  - $\text{joule K}^{-1} \text{mol}^{-1}$
  - all of these
9. The compressibility factor, z, for an ideal gas is
- zero
  - less than one
  - greater than one
  - equal to one
10. The work function (A) is defined as
- $A = E - TS$
  - $A = E + TS$
  - $A = TS - E$
  - none of these
11. Which three factors affect the rate of a chemical reaction?
- temperature, pressure and humidity
  - temperature, reactant concentration and catalyst
  - temperature, reactant concentration and pressure
  - temperature, product concentration and container volume
12. For first-order reactions the rate constant, k, has the unit(s)
- $\text{l mol}^{-1}$
  - $\text{time}^{-1}$
  - $(\text{mol/l})^{-1} \text{time}^{-1}$
  - $\text{time mol l}^{-1}$
13. What are the units of the rate constant for a reaction in solution that has an overall reaction order of two? (M is molarity, s is seconds.)
- $\text{M}^{-1} \text{s}^{-1}$
  - $\text{M}^{-1}$
  - $\text{s}^{-1}$
  - $\text{M s}^{-1}$

- Q2:** A solution of  $\text{H}_2\text{O}_2$  when titrated against  $\text{KMnO}_4$  solution at different time intervals gave the following results:

t (minutes)	0	10	20
Vol KMnO <sub>4</sub> used for 10 ml H <sub>2</sub> SO <sub>4</sub>	23.8 ml	14.7 ml	9.1 ml

Show that the decomposition of  $\text{H}_2\text{O}_2$  is a first order reaction.

[illegible]

**Q3:** 30.4 kJ is required to melt one mole of sodium chloride. The entropy change during melting is  $28.4 \text{ J mol}^{-1} \text{ K}^{-1}$ . Calculate the melting point of sodium chloride.

**Q4:** One mole of steam water compressed reversibly to water at its boiling point. The heat of vaporization 89 cal/mol. calculate  $q, W, \Delta H, \Delta E, \Delta A, \Delta G, \Delta S$ .

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Examiner,  
Asst. Prof Dr. Faiz M. H AL-Abady

Examination Committee Seal

Department Head  
Asst. Prof Dr. Faiz M. H AL-Abady