

**UNIVERSITY OF BAHRAIN**  
**DEPARTMENT OF CHEMISTRY**  
**3<sup>rd</sup> hour Exam CHEMISTRY 101**  
**FIRST SEMESTER 2010/ 2011**

**TIME: (90 mins)**

**\*Examiners: Drs. Sadeq, Salim, M. Al-Arab Ameera, Jameela, Saeed, Ali Hussain, Suad, Saad and ,Fadheela, Abdulla, Rema**

**DATE: 29<sup>th</sup> December, 2010 (Wednesday)**

**PLACE: Hall -18 (Examination Hall)**

**Name: \_\_\_\_\_ I.D.# \_\_\_\_\_ Sec. \_\_\_\_\_**

**Circle the letter of the one correct answer. A double page of foolscap paper is provided for calculations, but only the circled answers on this exam copy will be graded. Each question is worth one (1) point. Check that your paper has two parts Part A and Part B. Part A has 15 questions and Part B has 6 questions.**

$K = t(^{\circ}C) + 273.15;$	$760 \text{ mm Hg} = 1 \text{ atm}$
$R = 0.0821 \frac{\text{L.atm}}{\text{mol.K}}$	
$R_H = 2.18 \times 10^{-18} \text{ J}$	$h = 6.626 \times 10^{-34} \text{ J.s}$
	$c = 3.00 \times 10^8 \text{ ms}^{-1}$

- Q.1.** A sample of a gas occupies  $1.40 \times 10^3$  mL at  $25^{\circ}C$  and 760 mmHg. What **volume** will it occupy at the same temperature and 380 mmHg?
- A) 2,800 mL   B) 2,100 mL   C) 1,400 mL   D) 1,050 mL   E) 700 mL
- Q.2.** The gas pressure in a cylinder can is 1.8 atm at  $25^{\circ}C$ . If the gas is an ideal gas, what **pressure** would develop in the cylinder if it were heated to  $475^{\circ}C$ ?
- A) 9.04 atm   B) 0.717 atm   C) 3.26 atm   D) 4.52 atm   E) 13.5 atm
- Q.3.** **How many molecules of  $N_2$  gas** can be present in a 2.5 L flask at  $50^{\circ}C$  and 650 mmHg?
- A)  $2.4 \times 10^{22}$  molecules                      D)  $3.6 \times 10^{25}$  molecules  
B)  $4.9 \times 10^{22}$  molecules                      E)  $1.46 \times 10^{23}$  molecules  
C)  $3.1 \times 10^{23}$  molecules
- Q.4.** Which of these gases will have the **greatest density** at the STP?
- A)  $H_2$                       B)  $CCl_3F$                       C)  $CO_2$                       D)  $C_2H_6$                       E)  $CF_4$

**Q.5.** A sample of carbon monoxide gas was collected in a 2.0 L flask over water at 28°C and 810 mmHg. Calculate the **number of CO molecules** in the flask. (The vapor pressure of water at 28°C is 28.3 mmHg).

- A)  $5.0 \times 10^{22}$    B)  $2.5 \times 10^{22}$    C)  $1.0 \times 10^{23}$    D)  $5.4 \times 10^{23}$    E)  $3.8 \times 10^{25}$

**Q.6.** How many liters of oxygen gas at 153°C and 0.820 atm can be produced by the decomposition of 22.4 g of solid  $\text{KClO}_3$ ?



- A) 23.3 L   B) 0.085 L   C) 46.8 L   D) 7.79 L   E) 11.7 L

**Q.7.** A gas mixture of Ne and Ar has a total pressure of 4.00 atm and contains total 16.0 mol of gas. If the partial pressure of Ne is 2.75 atm, **how many moles of Ar** are in the mixture?

- A) 9.25   B) 11.0   C) 5.00   D) 6.75   E) 12.0

**Q.8.** Green laser emit radiation at 532 nm. The **frequency and energy** of this radiation are:

- A)  $8.12 \times 10^{13}$  Hz   and    $2.90 \times 10^{-16}$  J, respectively  
B)  $5.64 \times 10^{14}$  Hz   and    $3.74 \times 10^{-19}$  J, respectively  
C)  $1.60 \times 10^{15}$  Hz   and    $4.60 \times 10^{-15}$  J, respectively  
D)  $1.4 \times 10^{14}$  Hz   and    $9.34 \times 10^{-20}$  J, respectively  
E)  $2.82 \times 10^{14}$  Hz   and    $1.87 \times 10^{-19}$  J, respectively

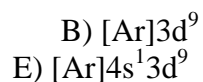
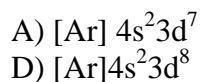
**Q.9.** A line in the Balmer Series occurs at 397.01 nm. Calculate “ **$n_{\text{hi}}$** ” for the transition associated with this line.

- A) 3   B) 4   C) 5   D) 6   E) 7

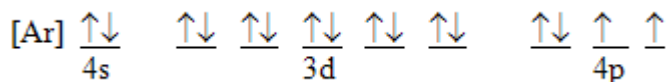
**Q.10.** Which one of the following sets of quantum numbers is **not possible**?

n	l	$m_l$	$m_s$
A. 4	3	-2	+1/2
B. 3	0	1	-1/2
C. 3	0	0	+1/2
D. 2	1	1	-1/2
E. 2	0	0	+1/2

**Q.11.** What is the electron configuration of  $\text{Cu}^{+1}$



**Q.12.** Which ground-state atom has **an electron configuration** described by the following *orbital diagram*?



A) phosphorus

B) germanium

C) selenium

D) tellurium

E) none of these

**Q.13.** A ground-state atom of **manganese** has \_\_\_ unpaired electrons and is \_\_\_\_\_.

A) 0, diamagnetic

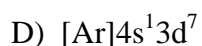
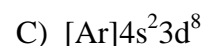
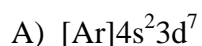
D) 5, paramagnetic

B) 2, diamagnetic

E) 7, paramagnetic

C) 3, paramagnetic

**Q.14.** Which of the following is the electron configuration of an **excited state** of an iron atom?



**Q.15.** Which ion is *isoelectronic with Ar*?

A)  $\text{Fe}^{2+}$

B)  $\text{F}^-$

C)  $\text{Br}^-$

D)  $\text{Ga}^{3+}$

E)  $\text{Ca}^{2+}$