REVISION QUESTIONS
SECOND MIDTERM 2011

1. What is the density of NH_3 gas at 100 °C and 0.4 atm?
   a- 0.111 g/L   b- 0.222 g/L   c- 0.333 g/L   d- 0.445 g/L

2. A mixture of four gases has a total pressure of 1400 mmHg at 298 K. and contains 2.2 mol O_2, 2.4 mol N_2, 2.6 mol H_2 and 2.8 mol Ar. The partial pressure of Ar is
   a- 308 mmHg   b- 336 mmHg   c- 364 mmHg   d- 392 mmHg

3. A helium-neon (or HeNe) laser emits light at 632.8 nm. What is the energy of a single photon from this laser?
   a- 3.14×10^{-19} J   b- 4.07×10^{-19} J   c- 4.78×10^{-19} J   d- 5.90×10^{-19} J

4. What is the de Broglie wavelength (in nm) associated with a 3.50 g Ping-Pong ball traveling by 15.0 m/s?
   a- 1.26×10^{-23} b- 1.18×10^{-23} c- 1.11×10^{-23} d- 1.05×10^{-23}

5. What is the total capacity of electrons in an orbital with $\mathbf{n} = 6$, $l = 0$?
   a- 2   b- 6   c- 10   d- 14

6. What is the electronic configuration of Cr?
   a- $[Ar]4s^1 3d^5$ b- $[Ar]4s^2 3d^4$ c- $[Kr]5s^1 4d^5$ d- $[Kr]5s^2 4d^4$

7. The correct order of radius in the following is
   a- $O^{2-} < O$ b- $Cl^- > Cl$ c- $Fe^{2+} > Fe$ d- $Fe^{2+} < Fe^{3+}$

8. The Na^+ ion, is isoelectronic with
   a- K^+ b- O^{2-} c- Cl^- d- S^{2-}

9. Which of the following compounds does not obey octet rule?
   a- NF_3 b- CH_4 c- H_2O d- AsH_5

10. The number of valence electrons in Be atom is
    a- 1   b- 2   c- 3   d- 4

11. Which of these pairs of elements would be most likely to form an ionic compound?
    a- P and Cl   b- Zn and K   c- F and Al   d- C and S

12. What is the de Broglie wavelength (in nm) associated with a 3.50 g Ping-Pong ball traveling by 18.0 m/s?
    a- 1.26×10^{-23} b- 1.18×10^{-23} c- 1.11×10^{-23} d- 1.05×10^{-23}

13. Which of the following sets of quantum numbers refers to an electron in a 4p orbital?
    a- $\mathbf{n} = 4$, $l = 0$, $\mathbf{m}_l = 0$, $\mathbf{m}_s = +1/2$ b- $\mathbf{n} = 4$, $l = 1$, $\mathbf{m}_l = 0$, $\mathbf{m}_s = +1/2$
    c- $\mathbf{n} = 4$, $l = 2$, $\mathbf{m}_l = 1$, $\mathbf{m}_s = +1/2$ d- $\mathbf{n} = 4$, $l = 3$, $\mathbf{m}_l = 3$, $\mathbf{m}_s = +1/2$

14. What is the total capacity of electrons in an orbital with n = 3, $l = 2$?
    a- 2   b- 6   c- 10   d- 14

15. How many unpaired electrons are in germanium atom ($_{32}Ge$)?
    a- 1   b- 2   c- 3   d- 4

16. The frequency of visible light having a wavelength 486 nm is:
    a- 2.06×10^{14} Hz   b- 2.06×10^{6} Hz   c- 6.17×10^{14} Hz   d- 1.20×10^{-15} Hz

17. What is the energy in joules of a mole of photons associated with visible light of wavelength 486 nm?
    a- 246 kJ   b- 6.46×10^{-25} J   c- 2.46×10^{-4} J   d- 12.4 kJ

18. What is the wave length for a photon emitted during a transition from $n_o = 5$ to $n_i = 2$ in the hydrogen atom?
    a- 343 nm   b- 532 nm   c- 434 nm   d- 387 nm
    b-

19. Which of these compounds is most likely to be ionic?
    a- NCl_3 b- $BaCl_2$ c- CO   d- SO_2

20. Which of the following is a representative element (Main Groups)?
    a- Pd   b- Ti   c- As   d- Fe

21. Which of these elements has the smallest first ionization energy?
    a- Si   b- C   c- Ba   d- Ca

22. The highest electron affinity in the following atoms is
    a- P   b- Al   c- Ga   d- Si

23. The K^+ ion, is isoelectronic with
    a- S^{2-} b- O^{2-} c- F^- d- Na^+

24. The pressure of a gas is measured as 60 torr. This pressure will be equal to:
    a- 7999 Pa   b- 0.079 Pa   c- 79.99 Pa   d- 0.799 Pa

25. A balloon is filled to a volume of 700 ml at 20.0 ^{o}C. The balloon is then cooled at constant pressure to a temperature of 100 K. What is the final volume of the balloon?
    a- 239 L   b- 239×10^{-3} L   c- 23.9 L   d- 0.239×10^{-3} L

26. Place the following atoms in order of increasing size: Ba, Ca, Mg, Na, and Rb.
    a. Na < Mg < Ca < Rb < Ba   b. Mg < Na < Ca < Rb < Ba
    c. Na < Rb < Mg < Ca < Ba   d. Ba < Rb < Ca < Mg < Na

27. A polar covalent bond would form in :
    a- Cl—Cl   b- H—H   c- Na—Cl   d- P—Cl

28. How many bonds around phosphor atom in phosphate anion, PO_4^{3-} ?
    a- 3   b- 4   c- 6   d- 8

29. The formal charge on phosphor atom in phosphate anion, PO_4^{3-} is
    a- 0   b- +1   c- +2   d- +3

30. Fill the following table for an ideal gas:

	P (atm)	V (L)	n (mol)	T
a		14.0	2.00	155 ^oC
b	4.47	25.0	2.01	

     a- 5.00 atm & 405 K   b- 5.00 atm & 255 ^0C
     c- 8.00 atm & 405 ^0C d- 5.00 atm & 405 ^0C

31. An ideal gas in a cylinder with a volume of 5.0 x 10^2 ml at a temperature of 30 ^oC and a pressure of 710 torr. The gas is then compressed to a volume of 25 ml and the temperature is raised to 820 ^oC. What is the new pressure of the gas?
     a- 510 torr   b- 5.1 x 10^{-4} torr   c- 5.1 x 10^4 torr   d- 0.510 torr

32. What mass of helium is required to fill a 1.50 L balloon at STP?
     a- 0.134 g   b- 0.267 g   c- 134 g   d- 267 g

33. 1.95 g/L is the density of a gas at 1.50 atm and 27 ^oC. What is the molar mass of the gas?
     a- 32.0 g/mol   b- 3.20 g /mol   c- 16.0 g /mol   d- 1.60 g \mol

34. The mole fraction of nitrogen in the air is 0.7808. Calculate the partial pressure of N_2 in air when the atmospheric pressure is 760 torr.
     a- 450 torr   b- 450 x 10^3 torr   c- 593 x 10^3 torr   d- 593 torr

35. Calculate the volume of oxygen at STP produced from the decomposition of 4.10 g mercuric oxide (HgO) by the reaction

$$2\ HgO_{(s)} \xrightarrow{\ Heat\ } 2\ Hg_{(l)} + O_{2\,(g)}$$

     a- 213 L   b- 21.3 L   c- 2.13 L   d- 0.213 L

36. A mixture of 1.00 g H_2 and 1.00 g He is placed in 1.00 L container at 27 ^oC. The total pressure for this mixture is :
     a- 18.5 atm   b- 12.3 atm   c- 6.15 atm   d- 10.5 atm

37. Which Lewis structure is possible for N_2O?

     a- :N≡N=Ö   b- :N≡N—Ö: c- :N≡N̈—Ö: d-
     :N̈=N—Ö:

38. A pair of electrons that is shared between two atoms is :
     a- a covalent bond   b- a lone pair
     c- a double bond   d- an ionic bond.

39. The electronic configuration of Fe^{2+} is:
     a- [Ar] $4s^2\ 3d^6$ b- [Ar] $4s^1\ 3d^5$ c- [Ar] $4s^2\ 3d^4$ d- [Ar] $3d^6$

40. The number of valance electrons in Mg atom is:
     a- 5   b- 2   c- 1   d- 4

41. Which of these ground-state atoms is diamagnetic?
     a- Ca   b- As   c- Cu   d- Fe