Spring Final Exam Practice Test #1

PART 1

1. How many protons neutrons electrons are in Carbon-12
   A) 12, 12, 12
   B) 6, 12, 6
   C) 12, 12, 6
   D) 12, 6, 12
   E) 6, 6, 6

2. How many protons and electrons are in an aluminum ion
   A) 13p, 16e
   B) 13p, 13e
   C) 13p, 10e
   D) 10p, 13e
   E) 10p, 10e

3. Which of the subatomic particles below has the greatest mass
   A) Electrons
   B) Protons
   C) Neutrons
   D) Helium atom
   E) None of these

4. Which of the below ions has a charge of -2
   A) F
   B) Mg
   C) Ca
   D) S
   E) Ne

5. Which subatomic particles are in the atoms nucleus
   A) Electron, Proton
   B) Proton, Neutron
   C) Electron, Neutron
   D) Proton, Electron, Neutron
   E) The nucleus in empty space

6. Which of the below orbitals is not possible
   A) 2s
   B) 6f
   C) 5d
   D) 6p
   E) 3f

7. What is the electron configuration for tin
   A) $1s^2 2s^2 2p^6 3s^2 3p^2$
   B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$
   C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$
   D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 5d^2$
   E) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^6$

8. What is the noble gas configuration of Chlorine
   A) [Mg] $3p^5$
   B) [Ar] $3s^2 3p^5$
   C) [Ne] $3s^2 3p^5$
   D) [S] $3s^2 3p^5$
   E) [Na] $3s^2 3p^5$

9. By what process does thorium-230 decay to radium-226
   A) Gamma emission
   B) Alpha emission
   C) Beta emieeion
   D) Positron emission
   E) None of these

10. ^{131}I has a half-life of 8.04 days. Assuming you start with a 1.53 mg sample of ^{131}I, how many mg will remain after 13.0 days?
    A) 0.835
    B) 0.268
    C) 0.422
    D) 0.440
    E) 0.499

11. The missing product from this reaction is _____.

$$^{32}_{15}P \rightarrow {}^{32}_{16}S + \_\_\_\_\_$$

    A) $^{4}_{2}He$

    B) $^{0}_{-1}e$

    C) $^{1}_{0}n$

    D) $^{0}_{1}e$

    E) $^{0}_{0}\gamma$

12. The beta decay of cesium-137 has a half-life of 30.0 years. How many years must pass to reduce a 25 mg sample of cesium 137 to 8.7 mg?
    A) 46
    B) 32
    C) 3.2
    D) 50
    E) 52

13. Which one of the following forms of radiation can penetrate the deepest into the body tissue
    A) Alpha
    B) Beta
    C) Gamma
    D) Proton
    E) Helium nucleus

14. What type of matter is Hg
    A) Metal
    B) Nonmetal
    C) Metalloid
    D) Solid (at 25°C)
    E) Gas (at 25°C)

15. Put these elements in order of greatest to smallest electronegativity (Ga, Ca, Cl)
    A) Ga<Ca<O
    B) Ca<O<Ga
    C) O<Ga<Ca
    D) Ca<Ga<O
    E) O<Ca<Ga

16. Which of the following compounds are ionic bonds
    A) H_2O
    B) CH_4
    C) AlF_3
    D) NO_2
    E) Cl_2

17. Which of the following compounds in covalent
    A) NaCl
    B) SO_2
    C) $Ca(OH)_2$
    D) Fe
    E) KBr

18. Which of the below elements is nonpolar
    A) H_2O
    B) NH_3
    C) O_2
    D) SBr_4
    E) NaCl

19. How are ionic bonds different then metallic and covalent bonds
    A) They are made of two or more elements
    B) They are made of two or more different elements
    C) They contain nonmetals
    D) They contain metals
    E) None of these

20. A particular radioisotope has a half-life of 15 years. What percentage of the isotope will remain after 45 years
    A) 100%
    B) 50%
    C) 25%
    D) 12.5%
    E) 6.25%

PART 2

1. Name the compound below S_2O
    A) sulfur dioxide
    B) disulfur oxide
    C) disulfur dioxide
    D) disulfur trioxide
    E) monosulfur monoxide

2. What is the formula for ammonium sulfate
    A) $(NH_3)_3SO_4$
    B) NH_4S
    C) $(NH_4)_2SO_4$
    D) NSO_4
    E) NH_4SO_4

3. How many oxygens are in the compound below $Al_2(SO_4)_3$
    A) 8
    B) 7
    C) 4
    D) 3
    E) 12

4. A valid Lewis structure of _____ cannot be drawn without violating the octet rule.
    A) NF_3
    B) BeH_2
    C) SO_2
    D) CF_4
    E) SO_3^{2-}

5. The molecular geometry of CH_2Cl_2 molecule is
    A) Trigonal planar
    B) Tetrahedral
    C) Trigonal pyramidal
    D) Octahedral

6. The molecular geometry of the SF_2 molecule is
    A) Linear
    B) Tetrahedral
    C) Trigonal planar
    D) Trigonal pyramidal
    E) Bent

7. Which lewis dot structure below is correct for O_2
    A) :O=O:
    B) :O—O:
    C) :O=O
    D) :O=O:
    E) O--O

8. When the following equation is balanced, the coefficients are
    $NH_3\ (g) + O_2\ (g) \rightarrow NO_2\ (g) + H_2O\ (g)$
    A) 1, 1, 1, 1
    B) 4, 7, 4, 6
    C) 2, 3, 2, 3
    D) 1, 3, 1, 2
    E) 4, 3, 4, 3

9. When the following reaction is balanced the sum of the coefficients is
    $FeCl_3\ (aq) + H_2S\ (g) \rightarrow Fe_2S_3\ (s) + HCl\ (aq)$
    A) 12
    B)
    C) 4
    D) 7
    E) 9

10. What type of reaction is below
    $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$
    A) Single displacement
    B) Double displacement
    C) Synthesis
    D) Combustion
    E) Decomposition

E) Bent

11. Calculate the molar mass of $AlPO_4$
A) 73g/mole
B) 100g/mole
C) 122g/mole
D) 95g/mole
E) 138g/mole

12. How many moles are in 100g of water?
A) 2.50 moles
B) 3 moles
C) 10 moles
D) 5.55 moles
E) 7.50 moles

13. How many atoms are in 25g of Calcium
A) 3.75E23 atoms
B) 6.24E-2 atoms
C) 5.34E12 atoms
D) 4.08E23 atoms
E) 6.02E23 atoms

14. How many grams are in 12 atoms of carbon
A) 12.01g
B) 6.00g
C) 2.39g
D) 1.25E-23g
E) 2.39E-22g

15. The combustion of propane (C_3H_8) produces CO_2 and H_2O:
C_3H_8 (g) + $5O_2$ (g) → $3CO_2$ (g) + $4H_2O$ (g)
The reaction of 2.5 mol of O_2 will produce _____ mol of H_2O.
A) 4.0
B) 3.0
C) 2.5
D) 2.0
E) 1.0

16. Calcium carbide (CaC_2) reacts with water to produce acetylene:
(C_2H_2) CaC_2 (s) + $2H_2O$ (g) →
$Ca(OH)_2$ (s) + C_2H_2 (g)
Production of 13 g of C_2H_2 requires consumption of _____ g of H_2O.
A) 4.5
B) 9.0
C) 18
D) 4.8E2
E) 4.8E-2

17. A balloon has a volume of 500ml at 25°C. If the balloon is heated on a hot day to 35°C what will its new volume be?
A) 251ml
B) 755ml
C) 517ml
D) 865ml
E) 453ml

18. A sample oargon gas at standard pressure occupies 1000. mL. At constant temperature, what volume does the gas occupy if the pressure increases to 800. mm Hg?
A) 500ml
B) 950ml
C) 760ml
D) 640ml
E) 1053ml

19. If a gas with an odor is released in a room, it quickly can be detected across the room because it
A) Diffuses
B) Is dense
C) Is compressed
D) Condenses
E) Effuses

20. The gas pressure in a container decreases when
A) The number of gas molecules is increased
B) The number of gas molecules is decreased
C) The temperature is increased
D) The number of molecules is increased and the temperature is increased
E) The volume is decreased

21. A pressure of 1.00 atm is the same as the pressure of _____mmHg
A) 193
B) 101
C) 29.9
D) 760
E) 33.0

22. The amount of gas that occupies 60.82L at 31oC and 367 mmHg is
A) 1.18 moles
B) 0.850 moles
C) 1.18 grams
D) 11.6 moles
E) 0.120 grams

23. At a temperature of _____ °C, 0.444 mol of CO gas occupies 11.8 L at 889 torr.
A) 379°C
B) 73 °C
C) 14 °C
D) 32 °C
E) 106 °C

24. A sample of gas (1.3 mol) occupies _____ L at 22 °C and 2.5 atm.
A) 0.079L
B) 0.94L
C) 13L
D) 31L
E) 3.2E-2L

25. A sample of gas (1.9 mol) is in a flask at 21 °C and 697 mm Hg. The flask is opened and more gas is added to the flask. The new pressure is 795 mm Hg and the temperature is now 26 °C. There are now _____ mol of gas in the flask.
A) 1.6 mole
B) 2.1 mole
C) 2.9 mole
D) 3.5 mole
E) 0.28 mole

PART 3

1. What is absolute zero
   A) The point at which matter loses all its mass
   B) The point at with matter has no pressure
   C) The point at with matter has no temperature
   D) The point at which matter has no kinetic energy
   E) Both D and C

2. What is the absolute temperature at 35ºC
   A) 268K
   B) 308K
   C) 208K
   D) 388K
   E) 225K

3. Which is the correct units for specific heat
   A) J
   B) J/g
   C) J/ºC.K
   D) J/g.ºC
   E) J/K

4. What is the unit for energy as heat flow
   A) K
   B) M
   C) J
   D) C
   E) T

5. How much energy is produced if 23g of aluminum is heated from 25ºC to 85ºC? specific heat of Al = 0.900j/g.K
   A) 1,242J
   B) 1,450K
   C) 1,326J
   D) 987J
   E) 8325J

6. How many grams of glass are heated with 1,845 joules of energy from 25oC to 78oC? The specific heat of glass = 0.840J/g.K
   A) 34.8gg
   B) 41.4g
   C) 45.3g
   D) 27.3g
   E) 54.3g

7. 25g of water A at 25ºC is mixed with 25g of water B producing a final temperature of 45oC. What is the initial temperature of water B?
   A) 10ºC
   B) 32ºC
   C) 65ºC
   D) 74ºC
   E) 85ºC

8. How much energy is absorbed to heat 53g of ice at -15oC to steam at 120oC?
   A) 123,546J
   B) 43,695J
   C) 163,475J
   D) 213,453J
   E) 143,845J

9. 35g of water at 25oC is cooled to -15oC how much energy is released?
   A) 16,448J
   B) 23,943J
   C) 10,943J
   D) 4.18J
   E) 45,324J

10. Which substance in the reaction below either appears or disappears the fastest?
$4NH_3 + 7O_2 \rightarrow 4NO_2 + 6H_2O$
   A) The rate of appearance/disappearance are the same for all these
   B) NH_3
   C) NO_2
   D) H_2O
   E) O_2

11. A burning splint will burn more vigorously in pure oxygen than in air because.
   A) Oxygen is a reactant in combustion and concentration of oxygen is higher in pure oxygen than is in air
   B) Oxygen is a catalyst for combustion
   C) Oxygen is a product of combustion
   D) Air has a slowing affect on the combustion reaction
   E) Oxygen as a product of the reaction helps to speed it up

12. Which one of the following is not a valid expression for the rate of the reation below?
$4NH_3 + 7O_2 \rightarrow 4NO_2 + 6H_2O$
   A) $-\frac{1}{7}\frac{\Delta[O_2]}{\Delta t}$
   B) $\frac{1}{4}\frac{\Delta[NO_2]}{\Delta t}$
   C) $\frac{1}{6}\frac{\Delta[H_2O]}{\Delta t}$
   D) $-\frac{D[NH_3]}{Dt}$
   E) All of the above are valid

13. A strong electrolyte is one that _____ completely in solution
   A) Reacts
   B) Disscociates
   C) Disappears
   D) Associates
   E) produces

14. The phrase “like dissolves like” refers to the fact that..
   A) Gases can only dissolve other gases
   B) Solvents can olny dissolve solutes of similar molar mass
   C) Polar solvents dissolve polar solutes and nonpolar solvents dissolve nonpolar solutes
   D) Condensed phases can only dissolve other condensed phases
   E) Polar solvents dissolve nonpolar solutes and vice versa

15. In a soda drink the CO_2 is the _____ and the water is the _____.
   A) Liquid, gas
   B) Solvent, solute
   C) Solvent, solvent
   D) Solute, solute
   E) Solute, solvent

16. Calculate the molar concentraio of HCl in a solution prepared by dissolving 5.5g of HCl in 200g of C2H6O .the density of the solution is 0.79g/ml
   A) 0.58
   B) 0.93
   C) 6.0E-6
   D) 1.72
   E) 21

17. How many liters of a 5 molar KOH solution contains 2.5 moles
   A) 1L
   B) 0.5L
   C) 2L
   D) 0.2L
   E) 5L

18. In a acid base neutralization these produces are produced.
   A) Acid and base
   B) Base and water
   C) Salt and water
   D) Acid and salt
   E) Water and acid

19. What is the concentration of H+ in a solution with a pH = 3.4
   A) 1.0E-3
   B) 2.1E-4
   C) 5.3E-4
   D) 4.0E-4
   E) 6.5E-4

20. What is the pH of a solution with 2.5E-5 molar of HCl
    A) 3.25
    B) 5.00
    C) 2.54
    D) 5.42
    E) 4.60

PART 4

1. The maximum number of electrons allowed in **each** of the d orbitals in
    A) 2
    B) 4
    C) 10
    D) 14
    E) 18

2. Which of the following electron configurations represents Tin(IV)
    A) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$
    B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^{10}$
    C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$
    D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^8 5p^2$
    E) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$

3. Ionization energy, the ability to remove an electron in the gaseous state, changes as you move across (L-R) the periodic table and down a group. Which of the following best describes that trend? (respectively periods/groups
    A) Decrease /decrease
    B) Decrease/ increase
    C) Increase/ decrease
    D) Increase / increase
    E) No change

4. What is the chemical formula for mercury(I) chloride
    A) Hg_2Cl
    B) $HgCl_2$
    C) $HgCl$
    D) Hg_2Cl_2
    E) Hg_2Cl_4

5. Two atoms of element A unite to form a molecule with formula A2, the bond between atoms in the molecules is
    A) metallic
    B) Electrovalent
    C) Polar covalent
    D) Ionic
    E) Non-polar covalent

6. All of the following are metals except
    A) Hg
    B) Al
    C) Na
    D) N
    E) Ag

7. How many hydrogen atoms are indicated by the formula $(NH_4)_2C_8H_4O_2$
    A) 12
    B) 8
    C) 20
    D) 24
    E) 16

8. The atomic particle having a mass of 4 amu and a charge of +2 is
    A) An electron
    B) An alpha particle
    C) A proton
    D) A neutron
    E) A beta particle

9. If $^{214}_{82}Pb$ undergoes a beta decay and the product of this decay undergoes another beta decay, which nuclide is produced?
    A) $^{212}_{82}Bi$
    B) $^{214}_{82}Pb$
    C) $^{214}_{84}Po$
    D) $^{212}_{83}Bi$
    E) $^{206}_{82}Pb$

10. A particular radioactive element has a half-life of 4.00 weeks. What percent of the original sample is left after 19.5 days?
    A) 75%
    B) 25%
    C) 52%
    D) 12.5%
    E) 62%

11. Which of the following is the highest energy orbital for a silicon atom?
    A) 3p
    B) 1s
    C) 3d
    D) 2s
    E) 2p

12. What would happen to the average kinetic energy of the molecules of a gas sample if the temperature of the sample increased from 20°C to 40°C?
    A) It would double
    B) In would increase
    C) It would decrease
    D) It would become half its value
    E) Two of these

13. Gaseous chlorine is held in two separate containers at identical temperature and pressure. The volume of container 1 is 1.30 L and it contains 6.70 mol of the gas. The volume of container 2 is 2.52 L. How many moles of the gas are in container 2?
    A) 0.489 mol
    B) 21.0 mol
    C) 13.0 mol
    D) 3.46 mol
    E) 15.0 mol

14. It is found that 250. mL of a gas at STP has a mass of 1.84 g. What is the molar mass?
    A) 7.36 g/mol
    B) 11.2 g/mol
    C) 22.4 g/mol
    D) 165 g/mol
    E) 48.7 g/mol

15. As water freezes the energy in the reaction is
    A) Absorbed
    B) Neither
    C) Both a and e
    D) Does not change
    E) Released

16. Which of the following processes is exothermic?
    A) Rolling a ball up hill
    B) Boiling water in a beaker to make steam
    C) Allowing meat to thaw after taking it out of the freezer
    D) Reacting hydrogen and oxygen gases to make water
    E) A popsicle meting on a warm summer day

17. A solution has a pH of 7.34. The solution H+ concentration is
    A) 1.00E-7
    B) 4.57E-8
    C) 2.34E-9
    D) 3.12E-7
    E) 8.32E-8

18. What is the concentration of [OH-} if you have 3.45E-6 M of [H+]
    A) 1.00E-8
    B) 3.45E-8
    C) 2.90E-9
    D) 4.29E-7
    E) 7.54E-7

19. Calculate the $[H^+]$ in a solution that has a pOH of 11.39.
    A) 2.45E-3
    B) 3.67E-10
    C) 4.07E-12
    D) 5.36E-12
    E) 6.32E-3

20. How long does it take californium-254 to decay from 98g to 25g if it has a half-life of 60.5 days
    A) 119 days
    B) 154 days
    C) 2 weeks
    D) 119 seconds
    E) 60.5 days

21. What is the final temperature if 25g of water at 25°C are poured it to 45g of water at 96°C?
    A) 34.5 °C
    B) 70.7 °C
    C) 63 °C
    D) 58.3 °C
    E) 74.3 °C

A general reaction written as $A + 2B \rightarrow C + 2D$ is studied and yields the following data:

$[A]_0$	$[B]_0$	Initial $\Delta[C]/\Delta t$
0.150 M	0.150 M	8.00×10^{-3} mol/L·s
0.150 M	0.300 M	1.60×10^{-2} mol/L·s
0.300 M	0.150 M	3.20×10^{-2} mol/L·s

22. What is the value of the rate constant
    A) 0.053
    B) 1.19
    C) 2.37
    D) 5.63
    E) none of these (a-d)

23. The $[OH^-]$ in a 0.62 M pyridine (C_5H_5N; $K_b = 1.7 \times 10^{-9}$) solution is
A) 1.1E-9M
B) 3.2E-5M
C) 0.62M
D) 5.2E-5M
E) 4.2E-4M

24. The $[H_3O^+]$ of a 0.77 M solution of NH_4Cl in H_2O at 25°C is (K_b for $NH_3 = 1.8 \times 10^{-5}$):
A) 4.3E-10 M
B) 3.7E-3 M
C) 2.1E-5 M
D) 0.77 M
E) 3.5E-4 M

25. Calculate the density of chlorine gas at STP.
A) 2.24g/l
B) 1.58g/l
C) 3.16g/l
D) 4.35g/l
E) 5.98g/l

26. Exactly 223.4 J will raise the temperature of 10.0 g of a metal from 25.0°C to 60.0°C. What is the specific heat capacity of the metal?
A) 0.843 J/g.K
B) 13.8 J/g.K
C) 53.4 J/g.K
D) 1.57 J/g.K
E) 0.638 J/g.K

PART 5

1. What is produced in the equations $^{273}_{92}U + {}^{4}_{2}\alpha \rightarrow ? + {}^{1}_{1}H$
A) $^{276}_{93}Np$
B) $^{268}_{90}Th$
C) $^{268}_{87}Ac$
D) $^{268}_{89}U$
E) $^{270}_{89}Ac$

2. What is the half life of a uranium sample that decays from 25g to 5g in 10 days
A) 48 hours
B) 62 hours
C) 103 hours
D) 203 hours
E) 52 hours

3. Cobalt-56 has a half life of 77 days. What percentage of the original sample is left after one year?
A) 50%
B) 3.74%
C) 12.5%
D) 24%
E) 5.23%

4. What is the rate law.
$NH_4^+{}_{(aq)} + NO_2^-{}_{(aq)} \rightarrow N_{2(g)} + 2H_2O_{(l)}$

Expt	$[NH_4^+]$	$[NO_2^-]$	Rate
1	0.010M	0.020M	0.020M/s
2	0.015M	0.020M	0.030M/s
3	0.010M	0.010M	0.005M/s

A) Rate = $k[NH_4^+][NO_2^-]$
B) Rate = $k[NH_4^+]^2[NO_2^-]^2$
C) Rate = $k[NH_4^+]^2[NO_2^-]$
D) Rate = $k[NH_4^+][NO_2^-]^2$
E) Rate = $k[NH_4^+][NO_2^-]^3$

5. What is the geometry of CF_2Cl_2
A) Linear
B) Trigonal Planar
C) Bent
D) Tetrahedral
E) Trigonal pyramidal

6. Which of the following formulas is incorrect
   A) NaBr
   B) MgF_2
   C) CaO
   D) NH_4O
   E) NaCl

7. Balance the following reaction and determine the sum of the coefficients
   $S + HNO_3 \rightarrow H_2SO_4 + NO_2 + H_2O$

   A) 11
   B) 12
   C) 13
   D) 14
   E) 16

8. What is the coefficient of the balance compound in bold
   $NH_3 + CuO \rightarrow Cu + N_2 + H_2O$

   A) 1
   B) 2
   C) 3
   D) 4
   E) 5

9. What is the final temperature in a bomb calorimeter if 25g copper metal at 95°C is placed into 50g water at 25°C? specific heat of copper 0.89j/g.°C
   A) 48°C
   B) 85°C
   C) 32°C
   D) 29°C
   E) 39°C

10. How many protons are in 24.02g of carbon
    A) 1.20E24
    B) 7.22E24
    C) 6.02E23
    D) 2.03E12
    E) 5.02E24

11. $NH_3 + CuO \rightarrow Cu + N_2 + H_2O$
    If 36g of NH_3 react in the above reaction how many grams of copper are produced?
    A) 201g
    B) 100g
    C) 50g
    D) 150g
    E) 250g

12. If 5 moles of methane react with oxygen how many moles of water are produced?
    A) 5 mol
    B) 7 mol
    C) 2 mol
    D) 3 mol
    E) 10 mol

13. If you double the Celsius temperature of a balloon it volume will
    A) Double in size
    B) Decrease by half
    C) Decrease
    D) Increase
    E) Not change

14. You have a balloon with 20g of a gas. Which balloon below will be the largest
    A) H_2
    B) O_2
    C) F_2
    D) CH_4
    E) CO_2

15. An carbon dioxide sample has a volume of 5.22 L at 29°C and 760.0 torr. How many carbon dioxide molecules does it contain?
    A) 6.02E23
    B) 1.27E23
    C) 3.22E24
    D) 2.34E21
    E) 5.21E20

16. What is the density of methane gas at STP
    A) 0.54g/L
    B) 1.2g/L
    C) 0.72g/L
    D) 0.89g/L
    E) 0/32g/L

17. What is the pH of a neutral solution at 100°C when its Kw = 1.0×10^{-12}
    A) 5
    B) 6
    C) 7
    D) 8
    E) 9

18. What is the $[H^+]$ of a solution with a pH of 2.56
    A) 5.32E-2
    B) 4.56E-3
    C) 1.24E-12
    D) 2.75E-3
    E) 7.23E-5

19. For weak acid, HX, $K_a = 1.0 \times 10^{-6}$. Calculate the pH of a 0.40 M solution of HX.
    A) 3.2
    B) 2.5
    C) 1.4
    D) 6
    E) 4.3

20. The $[H_3O^+]$ of a 0.45 M solution of NH_4Cl in H_2O at 25°C is (K_b for $NH_3 = 1.8 \cdot 10^{-5}$):
    A) 6.45E-4
    B) 7.23E-3
    C) 3.45E-5
    D) 2.34E-7
    E) 1.58E-5