Chemistry 115 Name Key

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Exam 4A December 10, 2008

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| --- | --- | --- |
|  | Points Earned | Points Possible |
| Part 1 multiple choice |  | 28 |
| Page 2  |  | 25 |
| Page 3 |  | 29 |
| Page 4 |  | 18 |
|  |  |  |
| Total |  | 100 |

All work must be shown to receive credit. Show all answers to the proper number of significant figures.

NA = 6.022 x 1023/mol

K = oC+273.16

0oC=273.16 K

Grossmont College

Periodic Table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  IA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | VIIA | NOBLE GASES |
| 1**H**1.008 | IIA |  |  |  |  |  |  |  |  |  |  | IIIA | IVA | VA | VIA | 1**H**1.008 | 2**He**4.002 |
| 3**Li**6.941 | 4**Be**9.012 |  |  |  |  |  |  |  |  |  |  | 5**B**10.81 | 6**C**12.01 | 7**N**14.01 | 8**O**16.00 | 9**F**19.00 | 10**Ne**20.18 |
| 11**Na**23.00 | 12**Mg**24.30 | IIIB | IVB | VB | VIB | VIIB |  VIII VIII VIII | IB | IIB | 13**Al**27.00 | 14**Si**28.09 | 15**P**30.97 | 16**S**32.06 | 17**Cl**35.45 | 18**Ar**39.95 |
| 19**K**39.10 | 20**Ca**40.08 | 21**Sc**44.96 | 22**Ti**47.90 | 23**V**50.94 | 24**Cr**52.00 | 25**Mn**54.94 | 26**Fe**55.85 | 27**Co**58.93 | 28**Ni**58.70 | 29**Cu**63.55 | 30**Zn**65.38 | 31**Ga**69.72 | 32**Ge**72.59 | 33**As**74.92 | 34**Se**78.96 | 35**Br**79.90 | 36**Kr**83.80 |
| 37**Rb**85.47 | 38**Sr**87.62 | 39**Y**88.91 | 40**Zr**91.22 | 41**Nb**92.91 | 42**Mo**95.94 | 43**Tc**(99) | 44**Ru**101.1 | 45**Rh**102.9 | 46**Pd**106.4 | 47**Ag**107.9 | 48**Cd**112.4 | 49**In**114.8 | 50**Sn**118.7 | 51**Sb**121.8 | 52**Te**127.6 | 53**I**126.9 | 54**Xe**131.3 |
| 55**Cs**132.9 | 56**Ba**137.3 | 57**La**138.9 | 72**Hf**178.5 | 73**Ta**180.9 | 74**W**183.9 | 75**Re**186.2 | 76**Os**190.2 | 77**Ir**192.2 | 78**Pt**195.1 | 79**Au**197.0 | 80**Hg**200.6 | 81**Tl**204.4 | 82**Pb**207.2 | 83**Bi**209.0 | 84**Po**(209) | 85**At**(210) | 86**Rn**(222) |
| 87**Fr**(223) | 88**Ra**226.0 | 89**Ac**227.0 | 104**Rf**(261) | 105**Db**(262) | 106**Sg**(263) | 107**Bh**(262) | 108**Hs**(265) | 109**Mt**(266) | 110**??**(269) |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 58**Ce**140.1 | 59**Pr**140.9 | 60**Nd**144.2 | 61**Pm**(147) | 62**Sm**150.4 | 63**Eu**152.0 | 64**Gd**157.3 | 65**Tb**158.9 | 66**Dy**162.5 | 67**Ho**164.9 | 68**Er**167.3 | 69**Tm**168.9 | 70**Yb**173.0 | 71**Lu**175.0 |
| 90**Th**232.0 | 91**Pa**231.0 | 92**U**238.0 | 93**Np**(237) | 94**Pu**(244) | 95**Am**(243) | 96**Cm**(247) | 97**Bk**(247) | 98**Cf**(251) | 99**Es**(252) | 100**Fm**(257) | 101**Md**(258) | 102**No**(259) | 103**Lr**(260) |

Lanthanide series

Actinide series

Part 1 – Multiple Choice (28 points)

1. Which phase change is evaporation?
	1. Solid to liquid
	2. Solid to gas
	3. Liquid to gas
	4. Liquid to solid
2. The vapor pressure of a liquid is the pressure, at equilibrium, of its
	1. Solid above its liquid
	2. Liquid above its solid
	3. Gas above its liquid
	4. Liquid above its gas
3. What type of bond exists between water molecules?
	1. Polar covalent
	2. Nonpolar covalent
	3. Ionic
	4. Hydrogen bond
4. At which temperature would CO2 gas be most soluble?
	1. 10. oC
	2. 20. oC
	3. 30. oC
	4. 40. oC
5. Which is the hydronium ion?
	1. H +1
	2. H3O +1
	3. OH -1
	4. OH2 -1
6. Which pH is most acidic?
	1. 3
	2. 7
	3. 9
	4. 14
7. What is the conjugate base of NH3?
	1. NH2 -1
	2. NH -2
	3. NH4 +1
	4. H +1
8. A beta particle has
	1. A mass of 4 amu
	2. A charge of +4
	3. A charge of -1
	4. Neither mass nor charge
9. In which type of reaction does a heavy nucleus absorb a neutron, split to form two or more

intermediate sized fragments, and release at least two neutrons?

* 1. Alpha decay
	2. Beta decay
	3. Fission
	4. Fusion
1. Which compound is organic?
	1. HOH
	2. NaOH
	3. HCl
	4. CH4
2. Which hydrocarbon series contains a double covalent bond between carbon atoms?
	1. Alkynes
	2. Alkenes
	3. Alkanes
	4. Aromatics
3. Starches are examples of
	1. Carbohydrates
	2. Proteins
	3. Lipids
	4. Nucleic acids
4. Fats and oils are called
	1. Monoglycerides
	2. Diglycerides
	3. Triglycerides
	4. Tetraglycerides
5. The most abundant steroid in the human body is
	1. Testosterone
	2. Progesterone
	3. Estrogen
	4. Cholesterol

**Part 2 – Problems and Questions (72 points)**

1. (8 points) Fill in the chart below

|  |  |
| --- | --- |
| IUPAC name | Molecular formula |
| Nitric acid | HNO3 |
| Hydrochloric acid | HCl |
| Sulfuric acid | H2SO4 |
| Hydrosulfuric acid or hydrogen sulfide | H2S |

1. (5 points) Which liquid is more viscous, water or motor oil? In which liquid do you suppose the intermolecular attractions are stronger? Explain.

Motor oil is more viscous. Because it is more viscous, it must have stronger intermolecular forces.

1. (6 points) What mass (g) of 63.7% solution can be prepared from 22.4 g of MgS?

$$?g solution=22.4 g MgS×\frac{100 g solution}{63.7 g MgS}=35.2 g solution$$

1. (6 points) Calculate the molarity of a solution prepared by dissolving 38.5 g of SrO in enough water to make 600.0 ml of solution.

$$M=\frac{mol SrO}{L solution}=\frac{38.5 g SrO×\frac{1 mol SrO}{103.62g SrO}}{0.6000 L soln}=\frac{0.3715 mol SrO}{0.6000 L}=0.6192 M SrO$$

1. (6 points) 33.6 ml of 0.903 M H2C2O4 is diluted to 150.0 ml. What is the molarity of the resulting solution?

$$M\_{1}V\_{1}=M\_{2}V\_{2} \rightarrow M\_{2}=M\_{1}\left(\frac{V\_{1}}{V\_{2}}\right)=0.903 M\left(\frac{33.6 mL}{150.0 mL}\right)=0.202 M H\_{2}C\_{2}O\_{4}$$

1. (6 points) A solution has an H3O+ concentration of 5.83 x 10-2 M. Determine [OH-], pH, and pOH.

[H3O+] = 5.83 x 10-2 M pH = 1.234

[OH-1] = 1.71 x 10-13 M pOH = 12.765

1. (6 points) A 25.00 ml sample of vinegar was titrated with 29.64 ml of 0.4052 M NaOH. Calculate the molarity of acetic acid in the vinegar sample.
	1. HC2H3O2 + NaOH ⎯→ NaC2H3O2 + H2O

$$mol NaOH=29.64 mL×\frac{0.4052 mol NaOH}{1000 mL}=0.01201 mol NaOH$$

$$mol HAc=mol NaOH=0.01201 mol HAc$$

$$M HAc=\frac{mol HAc}{L soln}=\frac{0.01201 mol HAc}{0.02500 L soln}=0.4804 M HAc$$

1. (6 points) Differentiate between fusion and fission based on your knowledge of nuclear chemistry?

Fusion is the combining of two nuclei to make a heavier particle.

Fission is the splitting of a heavy nuclear particle into two smaller particles.

1. (5 points) Gold-198 is a beta emitter used to assess kidney activity. Write the equation for the decay of gold-198.

$$\rightarrow +$$

1. (3 points) Give the IUPAC name of 

3,5-Dimethyl octane (best)

Or 2-ethyl-4-methyl heptane

1. (3 points) Give the IUPAC name of .

2-pentyne

1. (3 points) Draw a condensed structural formula for 2,2,4-trimethylhexane.
2. (3 points) Draw a condensed structural formula for 1-butyne.
3. (3 points) What kind of functional group is represented by ?

An amine

1. (3 points) What kind of functional group is represented by ?

A carboxylic acid