

CHEM 1402
Exam I
Dr. Melissa Kelley
September 29, 2011

You have 50 minutes to complete this exam. Provide the one best answer for each, following the instructions given in each section of the exam.

Multiple Choice: Select the one best answer for each question. Multiple answers will not be accepted. Each question is worth 3 points each.

- C 1. I weighed four pennies and obtained the following data:
4.45 g 4.46 g 4.44 g 4.43 g

The average true value is 4.00 g. Which of the following statements about the data is true?

- A. The data is precise and has systematic error.
- B. The data is accurate and has systematic error.
- C. The data is precise and has systematic and random error.
- D. The data is accurate and has random error.
- E. The data is accurate and has systematic and random error.

- A 2. Which is the largest volume?
A. 1×10^{12} μL B. 100 cL C. 10 μL D. 1×10^{-3} ML E. None listed

- D 3. Which is the most reactive?
A. Sulfide B. Aluminum ion C. Phosphide D. ~~Phosphate~~ Phosphorus

- B 4. Which of the following statements is not correct?
A. Electrons can behave as a wave.
B. Anions are formed from non-metals that loss electrons.
C. An electron being promoted from ground state to a higher energy level results in excitation.
D. Cations can react with non-metals.

- A 5. Which of the following relationships is not true?
A. Calcium ion is larger in atomic size than calcium.
B. Aluminum has a lower electron affinity than chlorine.
C. Cesium has lower ionization energy than sodium.
D. Chlorine has a smaller atomic size than sodium.

- D 6. Which of the following has the highest electron affinity?
A. I B. Cl C. Br D. F

- A 7. Which is the smallest distance?

- A. 1×10^{-12} Mm B. 100 mm C. 1×10^6 μm D. 1×10^3 cm E. None listed

Problems. Credit will only be given if you show your work and units. Circle your final answer. All answers should have the correct number of significant figures.

Useful information:

1 yard = 0.91 meters 1 lb = 454 g 1 in = 2.54 cm 1 L = 2.113 pints 1 gallon = 3.78 L

8. (8 points) A child needs to be given an i.v. antibiotic with a concentration of $50 \mu\text{g}/\mu\text{l}$. The child weighs 45 pounds, and the antibiotic needs to be given at a concentration of $250 \text{ mg}/\text{kg}$ of body weight. The drug needs to be delivered over 4.0 hours. How many milliliters per minute should you set the pump on the i.v. machine?

0.4 mL/min

9. (8 points) The television chef Paula Dean likes to cook with butter. She uses 1.0 sticks of butter per recipe, and does 3.0 recipes per television show. She does 100.0 shows per year. One stick of butter contains 8 tablespoons of butter, and one tablespoon is 14.79 mL. The density of butter is $56.9 \text{ lb}/\text{ft}^3$. How many pounds of butter does Paula Dean use in a year of her television show?

71 lbs

10. (6 points) Menthol, an anesthetic and chemical found in peppermint melts at 35°C and boils at 200°C . In what state is it found at 85°F ? A complete answer should include showing all of your work.

29°C solid

11. (6 points) Resting heart rate is 60.00 beats per minute, and the human heart pumps 70.00 mL per minute. How many heartbeats does it take to pump 12.00 pints of blood?

4868 heartbeats

12. (20 points) Fill in the following table for all missing spaces. In spaces where there is a line through that space, you do not need to provide an answer.

Element Name	Element Symbol	# Protons	# Neutrons	# Electrons	Atomic Mass Number	Atomic Number	Electron Configuration	Valence Electrons
Phosphide	P^{3-}	15	16	18	31	15	$1s^2 2s^2 2p^6 3s^2 3p^6$ (typo)	8
Calcium ion	Ca^{2+}	20	20	18	40	20	$1s^2 2s^2 2p^6$ $3s^2 3p^6$	8

Short Answer

13. (2 points each) In the space provide write the number of significant figures for each number.

- 1 a. 0.05 2 b. 0.00020×10^{-4}
4 c. 3.000 2 d. 5.2×10^5

14. (3 points each) Perform the following calculations and give the appropriate number of significant figures.

$(0.003 \text{ g} \times 41.03) / 0.12 =$ 1g

$44.001 \text{ g} + 0.1 \text{ g} + 0.125 \text{ g} =$ 44.2g

15. (3 points each) In the space provided label each process as a chemical change or physical change.

- Physical a. Frosting a cake.
Chemical b. Frying bacon.
Physical c. Adding sugar to water.

16. (2 points each) Classify each of the following as heterogeneous or homogeneous mixtures

- Heterogeneous a. A bag of chips
Homogeneous b. A cup of black coffee
Heterogeneous c. A vanilla ice cream cone
Homogeneous d. A can of oil

The Periodic Table of the Elements

1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H Hydrogen 1.00794	He Helium 4.003	3	4	23	24	25	26	27	28	29	30	31	32	33	34	35	36
2	Li Lithium 6.941	Be Beryllium 9.012182	5	6	13	14	15	16	17	18	19	20	37	38	39	40	41	42
3	Na Sodium 22.989770	Mg Magnesium 24.3050	11	12	19	20	21	22	39	40	41	42	43	44	45	46	47	48
4	K Potassium 39.0983	Ca Calcium 40.078	17	18	35	36	37	38	45	46	47	48	49	50	51	52	53	54
5	Rb Rubidium 85.4678	Sr Strontium 87.62	43	44	51	52	53	54	55	56	57	58	59	60	61	62	63	64
6	Cs Cesium 132.90545	Ba Barium 137.327	59	60	67	68	69	70	71	72	73	74	75	76	77	78	79	80
7	Fr Francium (223)	Ra Radium (226)	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
			103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
			Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	Tb Terbium 158.92534	Dy Dysprosium 162.50	Ho Holmium 164.93032	Er Erbium 167.26	Tm Thulium 168.93421	Yb Ytterbium 173.04	Lu Lutetium 174.967		
			90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
			Th Thorium 232.0381	Pa Protactinium 231.03588	U Uranium 238.0289	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)		
			87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
			La Lanthanum 138.9055	Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	Tb Terbium 158.92534	Dy Dysprosium 162.50	Ho Holmium 164.93032	Er Erbium 167.26	Tm Thulium 168.93421	Yb Ytterbium 173.04	Lu Lutetium 174.967	
			85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
			Ta Tantalum 180.9479	Hf Hafnium 178.49	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	Rg Roentgenium (268)	Cn Copernicium (285)	Fl Flerovium (286)	Mc Moscovium (288)	Lv Livermorium (293)	Ts Tennessine (294)	Og Oganesson (294)	
			81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
			In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.760	Te Tellurium 127.60	I Iodine 126.90447	Xe Xenon 131.29	Ba Barium 137.327	La Lanthanum 138.9055	Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	
			79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
			Ag Silver 107.8682	Cd Cadmium 112.411	In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.760	Te Tellurium 127.60	I Iodine 126.90447	Xe Xenon 131.29	Ba Barium 137.327	La Lanthanum 138.9055	Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	
			75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
			Rh Rhodium 102.90550	Pd Palladium 106.42	Ag Silver 107.8682	Cd Cadmium 112.411	In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.760	Te Tellurium 127.60	I Iodine 126.90447	Xe Xenon 131.29	Ba Barium 137.327	La Lanthanum 138.9055	Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	
			71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
			Cu Copper 63.546	Zn Zinc 65.39	Ga Gallium 69.723	Ge Germanium 72.61	As Arsenic 74.92160	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.80	Rb Rubidium 85.4678	Sr Strontium 87.62	Y Yttrium 88.90585	Zr Zirconium 91.224	Nb Niobium 92.90638	Mo Molybdenum 95.94	Tc Technetium (98)	
			65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
			Al Aluminum 26.981538	Si Silicon 28.0855	P Phosphorus 30.973761	S Sulfur 32.066	Cl Chlorine 35.4527	Ar Argon 39.948	K Potassium 39.0983	Ca Calcium 40.078	Sc Scandium 44.955910	Ti Titanium 47.867	V Vanadium 50.9415	Cr Chromium 51.9961	Mn Manganese 54.938049	Fe Iron 55.845	Co Cobalt 58.933200	
			59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
			Al Aluminum 26.981538	Si Silicon 28.0855	P Phosphorus 30.973761	S Sulfur 32.066	Cl Chlorine 35.4527	Ar Argon 39.948	K Potassium 39.0983	Ca Calcium 40.078	Sc Scandium 44.955910	Ti Titanium 47.867	V Vanadium 50.9415	Cr Chromium 51.9961	Mn Manganese 54.938049	Fe Iron 55.845	Co Cobalt 58.933200	