

Name _____ Rec. TA/time _____

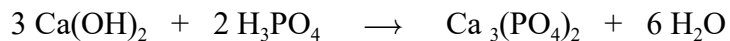
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1. (3 pts) How many grams of KClO_4 are required to prepare 568.3 mL of a 0.685 M KClO_4 solution.
(Atomic weights: K = 39.10, O = 16.00, Cl = 35.45)

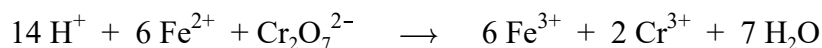
2. (5 pts) What is the concentration of a NaOH solution if 45.0 mL is required to neutralize 50.0 mL of 0.141 M H_3PO_4 ?



3. (4 pts) What volume (mL) of 0.0521 M $\text{Ca}(\text{OH})_2$ is required to neutralize 12.0 mL of 0.141 M H_3PO_4 ?



4. (5 pts) The titration of 25.0 mL of potassium dichromate solution with 0.0350 M Fe^{2+} solution requires 27.5 mL of the iron solution. The iron and dichromate react according to the following equation. What is the molarity of the potassium dichromate? (Atomic weights: Fe = 55.85, Cr = 52.00, O = 16.000, H = 1.008)



5. (3 pts) Which of the following pairs of ions would be expected to have a greater electrostatic force of attraction between them when separated by 1 nm?
- a) Na^+ and Cl^-
 - b) Na^+ and O^{2-}
 - c) Ca^{2+} and Cl^-
 - d) Mg^{2+} and O^{2-}
 - e) Mg^{2+} and Cl^-
6. (4 pts) The work done when a gas is compressed in a cylinder is 580.7 J. A heat transfer of 85.68 kJ occurs from the gas to the surroundings. Calculate ΔE of the gas in kJ.

7. (3 pts) Which of the following statements is **FALSE**?
- a) The change in enthalpy, ΔH , does not depend on the path taken, only on the initial and final states.
 - b) $\Delta E = q_p - P\Delta V$
 - c) For an exothermic process the products are at higher energy than the reactants.
 - d) $\Delta H = q_p$ (heat at constant pressure)
 - e) Heat, q , depends on the path taken.
8. (4 pts) A piston is pushed down on a reaction vessel containing a gas phase reaction.
- a) Does the system do work on the surroundings or is work done on the system by the surroundings?
 - b) What would be the sign of the work, w ?
 - c) If the process is also endothermic is heat being added to or removed from the system?
 - d) What would be the sign of ΔE or can that not be determined based on the information given? Explain!
9. (4 pts) Given the following equation, how many **grams** of **acetylene** gas are required to produce 1208 kcal of heat energy by combustion with oxygen? (Atomic weights: C = 12.01, H = 1.008, O = 16.00; Mol. Wts.: $C_2H_2 = 26.04$, $O_2 = 32.00$, $CO_2 = 44.01$, $H_2O = 18.02$)
- $$2 C_2H_2 (g) + 5 O_2 (g) \rightarrow 4 CO_2 (g) + 2 H_2O (g) \quad \Delta H = -302 \text{ kcal}$$

USEFUL INFORMATION

1 amu = 1.66×10^{-24} g
 Avogadro's number = 6.02×10^{23} particles/mole

	IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII B			IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 H 1																	4.003 He 2
2	6.941 Li 3	9.012 Be 4											10.811 B 5	12.011 C 6	14.007 N 7	15.999 O 8	18.998 F 9	20.179 Ne 10
3	22.990 Na 11	24.305 Mg 12											26.98 Al 13	28.09 Si 14	30.974 P 15	32.06 S 16	35.453 Cl 17	39.948 Ar 18
4	39.098 K 19	40.08 Ca 20	44.96 Sc 21	47.88 Ti 22	50.94 V 23	52.00 Cr 24	54.94 Mn 25	55.85 Fe 26	58.93 Co 27	58.69 Ni 28	63.546 Cu 29	65.38 Zn 30	69.72 Ga 31	72.59 Ge 32	74.92 As 33	78.96 Se 34	79.904 Br 35	83.80 Kr 36
5	85.47 Rb 37	87.62 Sr 38	88.91 Y 39	81.22 Zr 40	92.91 Nb 41	95.94 Mo 42	98 Tc 43	101.07 Ru 44	102.91 Rh 45	106.42 Pd 46	107.87 Ag 47	112.41 Cd 48	114.82 In 49	118.69 Sn 50	121.75 Sb 51	127.60 Te 52	126.90 I 53	131.39 Xe 54
6	132.91 Cs 55	137.33 Ba 56	138.91 La 57	178.39 Hf 72	180.95 Ta 73	183.85 W 74	186.21 Re 75	190.23 Os 76	192.22 Ir 77	195.08 Pt 78	196.97 Au 79	200.59 Hg 80	204.38 Tl 81	207.2 Pb 82	208.98 Bi 83	209 Po 84	210 At 85	222 Rn 86
7	223 Fr 87	226.03 Ra 88	227.03 Ac 89	261 Rf 104	262 Ha 105	263 Sg 106	262 Ns 107	265 Hs 108	266 Mt 109	269 110	272 111	277 112						

Lanthanide Series	140.12 Ce 58	140.91 Pr 59	144.24 Nd 60	145 Pm 61	150.36 Sm 62	151.96 Eu 63	157.25 Gd 64	158.93 Tb 65	162.50 Dy 66	164.93 Ho 67	167.26 Er 68	168.93 Tm 69	173.04 Yb 70	173.04 Lu 71
Actinide Series	232.04 Th 90	231.04 Pa 91	238.03 U 92	237.05 Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103

A PERIODIC CHART OF THE ELEMENTS
 (Based on ¹²C)