This quiz is take-home and open book, and it is intended that all members of the group contribute to completing it. It is a violation of the Academic Honor Code to sign a quiz that you did not work on. **The quiz is due at the end of class on Thursday, November 30.**

List names in alphabetical order, and print them clearly!
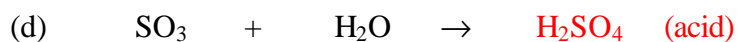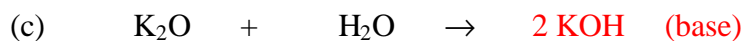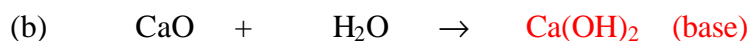### Put names on all pages, and staple pages together
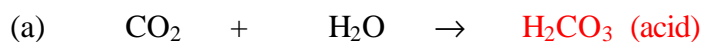
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Points

(4)   1.   Complete and balance the equations describing the reaction of the following oxides with water. Indicate whether the products would be an **acid** or a **base**.

(a) CO_2 + H_2O → H_2CO_3 (acid)

(b) CaO + H_2O → $Ca(OH)_2$ (base)

(c) K_2O + H_2O →   2 KOH   (base)

(d) SO_3 + H_2O → H_2SO_4 (acid)

0.5 pts product, 0.5 pts acid or base

(3)   2.   In the following **neutralization** reactions, **circle** the acid and **underline** the base.

(a)   NaOH   +   HCl   →   NaCl   + H_2O

(b) H_2SO_4 + $Ca(OH)_2$ → $CaSO_4$ +   2 H_2O

(c) NH_3 +   HCN   → NH_4CN
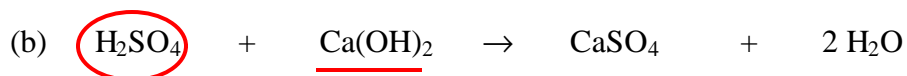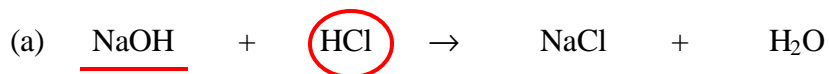
1 pt each pair marked correctly

_____   _____

_____   _____

_____   _____

(4)   3.   Fill in the following table with the corresponding hydrogen ion concentration, $[H^+]$, or hydroxide ion concentration, $[OH^-]$. Indicate whether the solution would be **acidic** or **basic**.

$[H^+]$	$[OH^-]$	acidic or basic?
3×10^{-4} M	3.3×10^{-11} M	acidic
4×10^{-9} M	2.5×10^{-6} M	basic
5×10^{-13}	2×10^{-2} M	basic
2×10^{-5}	5×10^{-10} M	acidic

(2)   4.   Calculate the pH of solutions with the following $[H^+]$:

         1.5 M   -0.18

         2.3×10^{-3} M   2.64 (3-0.36)

         4.5×10^{-6} M   5.35 (6-0.65)

         7.5×10^{-11} M   10.13 (11-0.87)

         (0.5 each. Don't deduct for sig figs or for rounding difference)

(2)   5.   Calculate the $[H^+]$ of solutions of the following pH:

         2.5 $10^{-2.5} = 10^{0.5} \times 10^{-3} = 3.2 \times 10^{-3}$ M

         4.9 $10^{-4.9} = 10^{0.1} \times 10^{-5} = 1.3 \times 10^{-5}$ M

         8.2 $10^{-8.2} = 10^{0.8} \times 10^{-9} = 6.3 \times 10^{-9}$ M

         13.1 $10^{-13.1} = 10^{0.9} \times 10^{-14} = 7.9 \times 10^{-14}$ M

         (0.5 pts each, -0.1 if M missing, don't deduct for significant figures)