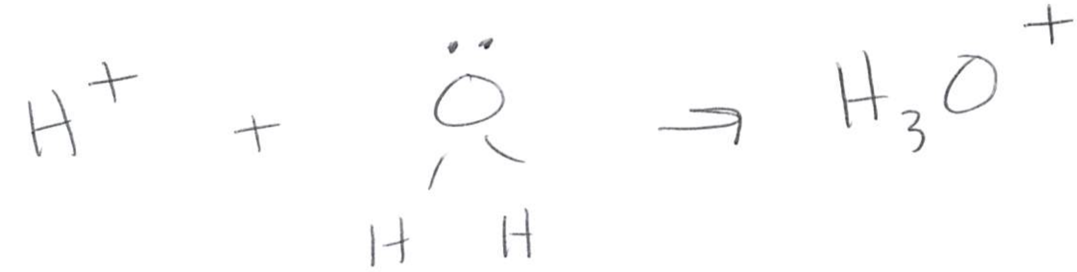
p 593

that's the pair of electrons it donates.

1 a)



Lewis ACID because it can <u>accept</u> a pair of electrons

Lewis BASE because it can <u>donate a pair of</u> electrons

1 b)

$$AlCl_3 + Cl^- \rightarrow AlCl_4^-$$

Lewis ACID because it can <u>accept</u> a pair of electrons

Lewis BASE because it can <u>donate</u> a pair of electrons

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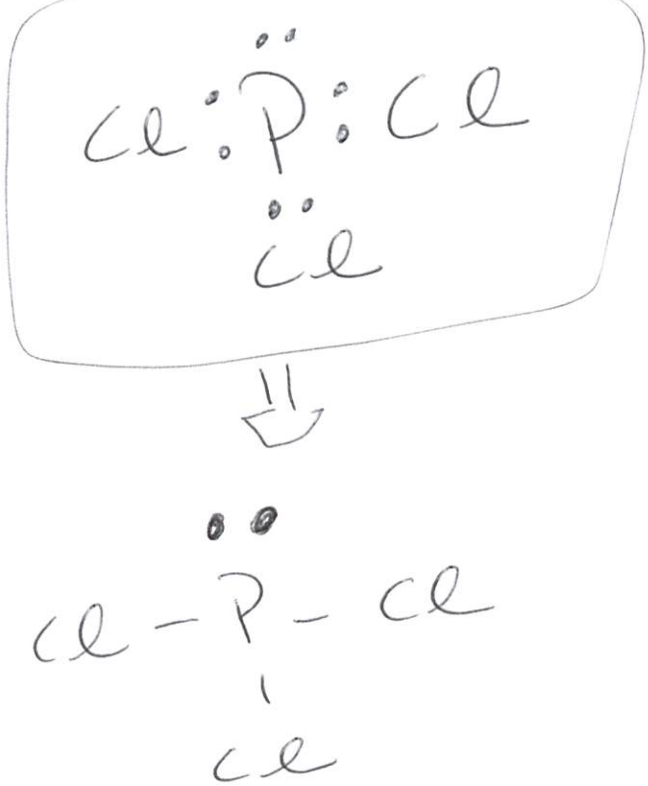
(2) PCl_3 Is it a Lewis ACID or BASE?

Phosphorus - 5 e^-
Cl - 1 e^- each
8 e^-



⇒ PCl_3 has a NON-bonding (unshared) pair of electrons which it could donate so it would likely be a Lewis Base

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(3) Properties of Acids / Bases

Both are electrolytes and change the color of an acid - base indicator

Acids taste sour

Bases taste bitter.

(4) Arrhenius Definition

An acid gives H^+'s

A base gives OH^-'s

(5) Bronsted-Lowry definition

Acids are H^+ donors

Bases are H^+ acceptors

NOTICE: it eliminates OH^-'s from consideration to expand the definition

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6 <u>Lewis</u> <u>definition</u> (most expansive definition)

Lewis ACID is electron-pair <u>Acceptor</u>

Lewis base is electron-pair <u>donor</u>.

7 See email <u>Conjugate</u> <u>AcID</u>-<u>base pairs</u>

a-b

8
a) H_2CO_3 - diprotic

b) H_3PO_4 - triprotic

c) HCl - monoprotic

d) H_2SO_4 - diprotic

NOTE: "protic" - i.e <u>proton</u> - i.e. H^+

H^+ is a proton :)

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* JUST ASKING whether ACID or BASE
* NO calculations necessary

9 a) $[H^+] = 6.0 \times 10^{-10}$ M

$-(-10) = \sim 10 = \boxed{\text{BASIC}}$

9 b) $[OH^-] = 3.0 \times 10^{-2}$ M

pOH = ~2

so.. pH = ~12 = $\boxed{\text{BASIC}}$

9 c) $[H^+] = 2.0 \times 10^{-7}$ M

$-(-7) = \sim 7 = \boxed{\text{neutral}}$

BUT → SIGNIFICAND is NOT 1.0 so it's actually going to be A little less than 7

☺ maybe I should use A calculator just to be sure !!

(2.0 [EE] [+/-] 7) [$\log_{10}$] =

−6.7 so

$-(-6.7) = \boxed{6.7 = \text{ACIDIC}}$

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(9) d) $[OH^-] = 1.0 \times 10^{-7}$ M

$-(-7) = 7 = pOH$

$\boxed{pH + pOH = 14}$

$pH + 7 = 14$

$\boxed{pH = 7}$

(10)

$[OH^-] = 1 \times 10^{-3}$ M

so $pOH = 3$

$pH + pOH = 14$

$pH + 3 = 14$

$\boxed{pH = 11}$ if $pH = 11$

then $[H^+] = \boxed{1 \times 10^{-11} \text{ M} = \text{BASIC}}$

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(11) $[H^+] = 1 \times 10^{-4}$ M

$pH = -\log[H^+]$

$= -\log(1 \times 10^{-4}) = \boxed{4.0} = pH$

$= -(-4) =$

(11b) $[H^+] = 0.0015$ M

NOTE - you do not need parenthesis

$pH = -\log[H^+]$

$= -\log(0.0015)$

$= -(-2.82) = \boxed{2.82} = pH$

(12a) $[H^+] = 1.0 \times 10^{-12}$ M

it is pH=12
but lets do it!

$pH = -\log[H^+]$

$= -\log(1.0 \times 10^{-12})$

$= -(-12) = \boxed{12}$

p599

12b $[H^+] = 0.045 M$

$pH = -\log[H^+]$

$= -\log(0.045)$

$= -(-1.35) = \boxed{1.35} = pH$

CALCULATOR $.045 \boxed{\log_{10}}$

---

p600 NOW we need $\boxed{10^x}$

$\boxed{13a}$ What is $[H^+]$ when given pH

$pH = 5.00$ so

by definition

$-\log[H^+] = 5.00$ so

MOVE the SIGN!

$\log[H^+] = -5.00$

$-5.00 \boxed{10^x} \rightarrow 0.00001 M$

EQUALS $\boxed{1.0 \times 10^{-5} M}$

SO we could have done that by SIGHT BUT it proves the concept ☺

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13b $pH = 12.83$

$-\log[H^+] = 12.83$

$-\log[H^+] = -12.83$

$\log[H^+] = -12.83$

on CALC ⇒ -12.83 $\boxed{10^x}$ →

0.000000000000148 M =

$$\boxed{1.5 \times 10^{-13} \text{ M}}$$

play with your CALC to see if you can get it directly into SCINOT

TRICK QUESTION ALERT — always be on look out for pH or pOH and hydrogen ion concentration or hydroxide concentration

14a

$-\log[H^+] = 4.00$ so ..

cut to the chase $\boxed{1.0 \times 10^{-4} \text{ M}}$

14b $-\log[H^+] = 11.55$

$\log[H^+] = -11.55$

$= 0.000000000002818$ M or

$$\boxed{2.8 \times 10^{-12} \text{ M}}$$