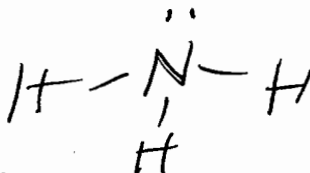


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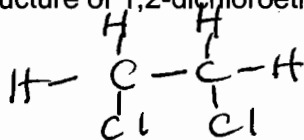
1. How many valence electrons do the following atoms or ions have?

- a) Nitrogen atom  $\frac{5}{4}$       d) Sodium ion ( $\text{Na}^+$ )  $\frac{2}{8}$   
b) Silicon atom  $\frac{4}{4}$       e) Oxide ion ( $\text{O}^{2-}$ )  $\frac{8}{8}$

2. Draw the Lewis structure of ammonia.



3. Draw the Lewis structure of 1,2-dichloroethane.

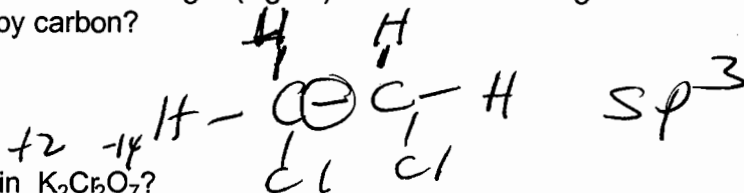


4. The pKa of methanol ( $\text{CH}_3\text{OH}$ ) is 16 and the pKa of ammonia ( $\text{NH}_3$ ) is 35. Which is a stronger base methoxide ( $\text{CH}_3\text{O}^-$ ) or amide ( $\text{NH}_2^-$ )?

*$\text{NH}_2^-$  weaker than  $\text{CH}_3\text{O}^-$*

*$\ominus \text{NH}_2$  stronger!*

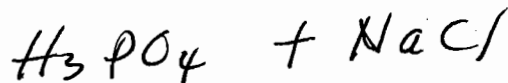
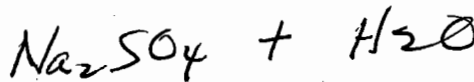
5. Give an example of a carbon compound containing  $\sigma$  (sigma) bonds. Circle a sigma bond. What kind of orbitals are used in  $\sigma$  bonding by carbon?



6. What is the oxidation number of Cr in  $\text{K}_2\text{Cr}_2\text{O}_7$ ?

*+6*

7. Complete the following acid-base equations.

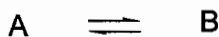


8. What is the pH of 0.01 M NaOH solution in water?

$$.01 = 10^{-2} \quad -\log 10^{-2} = 2$$

$$14 - 2 = 12$$

9. The equilibrium constant for the following reaction is 9. What is the percentage of A present at equilibrium?



$$K_{eq} \frac{B}{A} = 9$$

$$\% \text{ A} = \frac{1}{9+1} (100) = 10\%$$