

Soluzioni

CAPITOLO 13

VERIFICA LE TUE CONOSCENZE

L'IBRIDAZIONE DEGLI ORBITALI

1 Il carbonio può essere ibridato sp , sp^2 , sp^3 .



L'orbitale s nello stato eccitato si può fondere con uno, due o tre orbitali p dando ibridazione sp , sp^2 , sp^3 . In ogni tipo di ibridazione il carbonio ha 4 elettroni singoli e forma 4 legami covalenti raggiungendo l'ottetto.

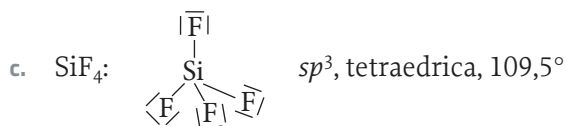
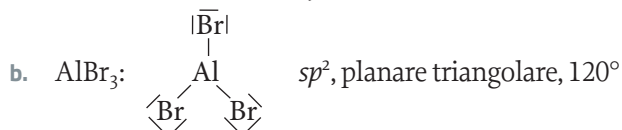
2 C) BH_3

3 B) AlF_3

4 A) SiBr_4

5

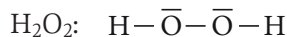
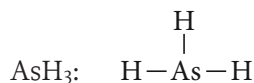
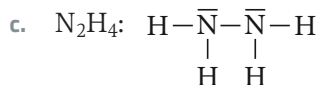
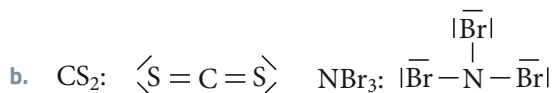
a. BeH_2 : $\text{H}-\text{Be}-\text{H}$ sp , lineare, 180°



LE FORMULE DI STRUTTURA DI LEWIS

6

a. HI : $|\underline{\text{I}}-\text{H}$; ICl : $|\underline{\text{I}}-\underline{\text{Cl}}|$ CO : $|\text{C}\equiv\text{O}|$



7

a. OH^- : $[\underline{\text{O}}-\text{H}]^-$ NO^+ : $[\text{N}\equiv\text{O}]^+$

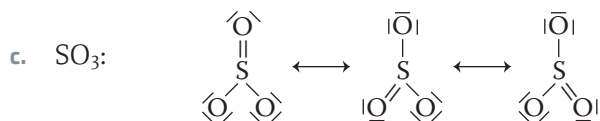
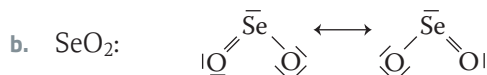
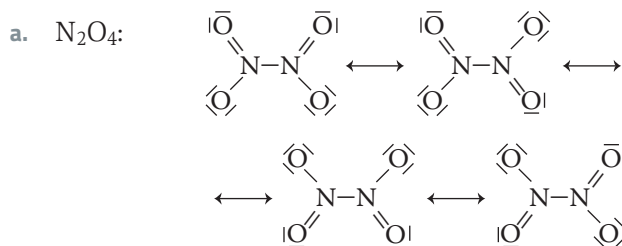
b. HS^- : $[\underline{\text{S}}-\text{H}]^-$ BrO^- : $[\text{Br}-\underline{\text{O}}]^-$

c. O_2^{2-} : $[\underline{\text{O}}-\underline{\text{O}}]^{2-}$ ClO^+ : $[\text{Cl}=\underline{\text{O}}]^+$

LA RISONANZA

8 C) nell'aumento della stabilità di una molecola.

9



10 B) 3

LA GEOMETRIA MOLECOLARE

11 B) dal numero di coppie elettroniche intorno all'atomo centrale.

12 C) piramidale triangolare.

13 C) SiBr_4

14 C) BF_3

15 A) planare triangolare.

16 D) H_2Se

17 A) CS_2

18 C) OF_2

19 A) AsCl_3

LA POLARITÀ DELLA MOLECOLA

20 Una molecola poliatomica è apolare se ha geometria lineare, planare triangolare o tetraedica e se gli atomi terminali sono dello stesso tipo.

21 Ⓒ SiH₄

22 Ⓑ CHCl₃

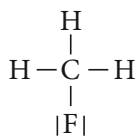
23 Ⓒ SiO₂

VERIFICA LE TUE ABILITÀ

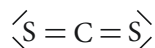
24 Ⓑ 120°

25

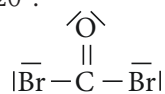
a. CH₃F: ibridazione *sp*³; disposizione tetraedica; angolo di legame 109,5°.



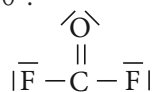
b. CS₂: ibridazione *sp*; disposizione lineare; angolo di legame 180°.



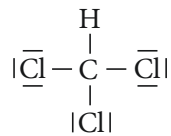
c. COBr₂: ibridazione *sp*²; disposizione planare triangolare; angolo di legame 120°.



d. COF₂: ibridazione *sp*²; disposizione planare triangolare; angolo di legame 120°.



e. CHCl₃: ibridazione *sp*³; disposizione tetraedica; angolo di legame 109,5°.

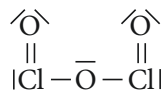


f. HCN: ibridazione *sp*; disposizione lineare; angolo di legame 180°.

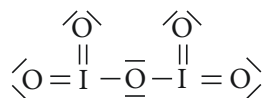


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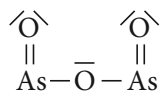
a. Cl₂O₃:



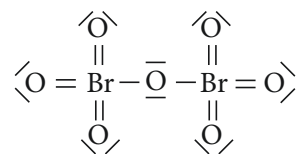
I₂O₅:



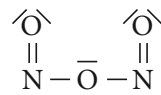
As₂O₃



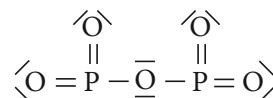
b. Br₂O₇:



N₂O₃:

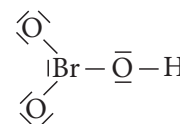


P₂O₅:

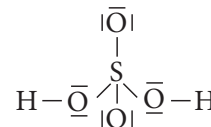


27

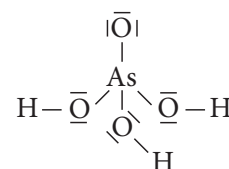
a. HBrO₃:



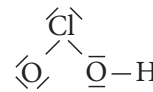
H₂SO₄:



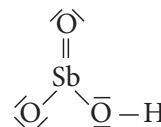
H₃AsO₄:



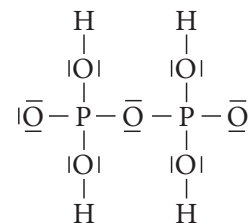
b. HClO₂:



HSbO₃:

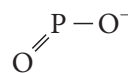


H₄P₂O₇:

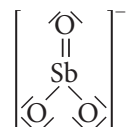


28

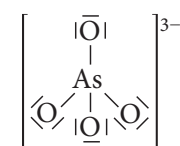
a. Pb₂²⁻:

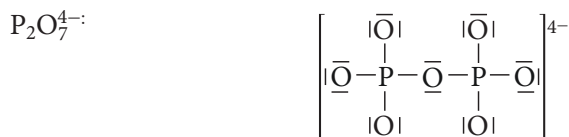
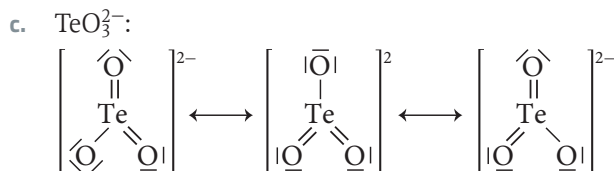
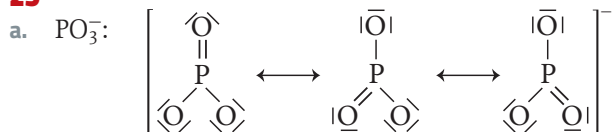
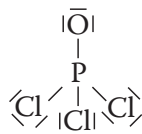
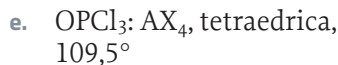
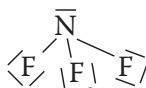
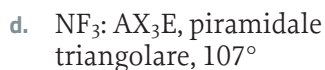
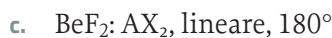
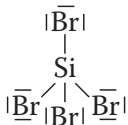
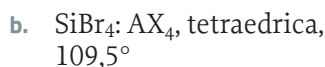
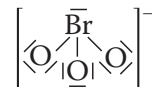
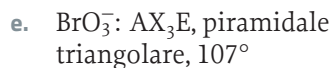
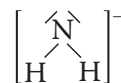
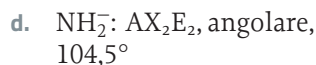
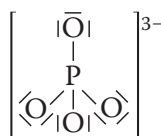
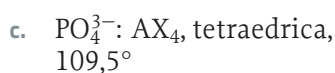
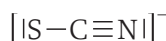
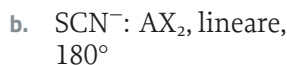
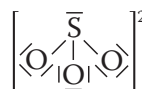


SbO₃⁻:



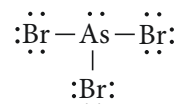
AsO₄³⁻:



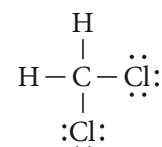
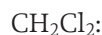

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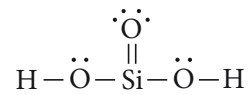
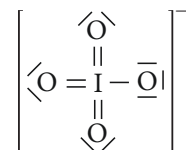

TEST YOURSELF

37 


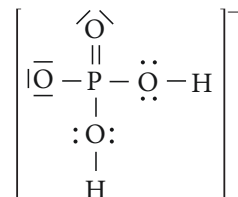
b.



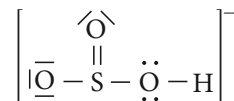
c.


38 


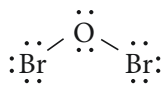
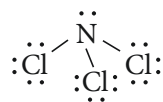
b.



c.



39 

 a. Br_2O : type AX_2E_2 , angular, bond angle $104,5^\circ$

 b. NCl_3 : type AX_3E , piramidal triangular, bond angle 107°

40  (A) the total dipole moment.

41  (D) AsCl_3
42  (B) H_2Te
43  (B) BrO_4^-
VERSO I GIOCHI DELLA CHIMICA
44 (A) $\text{CH}_2 = \text{CH}_2$ e AlH_3
45 (D) 120°
46 (C) Angolare.

47 (A) solo AlI_3 è apolare.

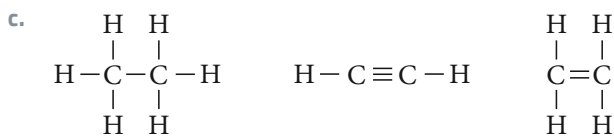
48 (B) BI_3
49 (D) SiF_4
50 affermazione *non* corretta:

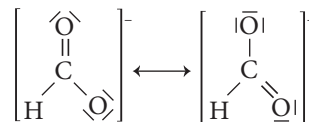
(C) è uno ione poliatomico con una carica negativa.

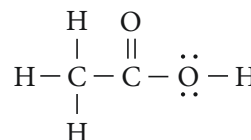
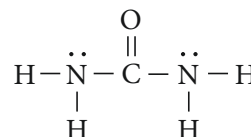
51 (D) BeI_2
VERSO L'UNIVERSITÀ
52 (D) CCl_4 è una molecola tetraedrica.

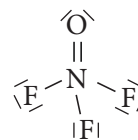
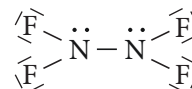
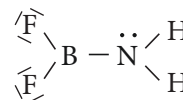
VERSO L'ESAME: LE TUE COMPETENZE
DEFINISCI E RAPPRESENTA
53

 a. C_2H_6 ibridazione sp^3 ; C_2H_2 ibridazione sp ; C_2H_4 ibridazione sp^2 .

 b. C_2H_6 : disposizione tetraedrica; angolo di $109,5^\circ$;
 C_2H_2 : disposizione lineare; angolo di 180° ;
 C_2H_4 : disposizione planare triangolare; angolo di 180° .

 d. $\text{C}\equiv\text{C} < \text{C}=\text{C} < \text{C}-\text{C}$

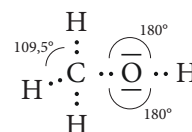
 e. $\text{C}-\text{C} < \text{C}=\text{C} < \text{C}\equiv\text{C}$
RAPPRESENTA
54

DEFINISCI E RAPPRESENTA
55

 a. CH_3COOH : ibridazione sp^3 (CH_3);
 ibridazione sp^2 (COOH);

 b. $(\text{NH}_2)_2\text{CO}$: ibridazione sp^2 (CO)

DEFINISCI E RAPPRESENTA
56

 a. ONF_3 : disposizione tetraedrica;
 angolo di $109,5^\circ$

 N_2F_2 : disposizione piramidale
 triangolare (AX_3E);
 angolo di 107°

 b. BF_2NH_2 : disposizione planare triangolare e angolo
 di 120° (BF_2); disposizione piramidale triangolare
 e angolo di 107° (NH_2)

CLASSIFICA
57

 a. CCl_4 , CH_3I , CH_3Br , CH_3Cl , CH_3F

 b. SiF_4 , F_3SiH , F_2SiH , FSiH_3
RAPPRESENTA E IPOTIZZA
58

 a. CH_4O

 b. Il carbonio è ibridato sp^3 .

c. La molecola è polare.

RIFLETTI

- 59** È possibile che una molecola con legami polari sia nel suo complesso apolare in quanto i dipoli dei legami si annullano per la simmetria della molecola (es. CCl_4 : struttura tetraedrica e sostituenti uguali).

CLASSIFICA
60

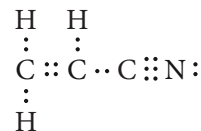
Molecola	Definizione
CH_4	e. Molecola apolare con legami covalenti polari con struttura tetraedrica.
Cl_2	f. Molecola formata da atomi dello stesso elemento.
H_2O	d. Molecola polare con legami covalenti polari dove l'atomo centrale presenta due doppietti liberi.
BF_3	a. Molecola poliatomiche con legami covalenti polari e struttura trigonale.
CHCl_3	c. Molecola polare con struttura tetraedrica e legami covalenti polari.
HCl	b. Molecola biatomica con legami covalenti polarizzati.

OSSERVA E DEDUCI

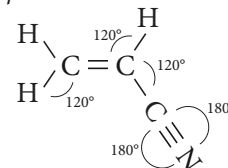
- 61** 1. sp^3 ; 2. sp^2 ; 3. sp^2 ; 4. sp
a. σ ; b. π , σ ; c. π , π , σ ; d. π , σ

RAPPRESENTA E DEDUCI

- 62** CH_2CHCN :



CH_2 : sp^2 ; CH : sp^2 ; CN : sp .


ANALIZZA

- 63**
- SF_6 : ibridazione sp^3d^2
 - $\text{O}_3\text{Cl}-\text{O}-\text{ClO}_3$: ibridazione sp^3
 - $\text{H}_2\text{N}-\text{CH}_2-\text{COOH}$: ibridazione sp^3
 - $\text{OC}(\text{NH}_2)_2$: ibridazione sp^2