

T+ Questom

- 1 A) ✓
- 2 Canvi isòtop:  $d_e = U_{min} = \delta^2 U_{min} = \sqrt{e} \neq p_9$  depèn  $\mu$  D) ✓
- 3 D) ✓ quan ultra canven + d'una coord. normal.
- 4 ~~E~~
- 5 ~~D~~

6) ~~B~~

7.  $^{16}O_2$   $\bar{\nu}_e = 1580 \text{ cm}^{-1}$   $\bar{\nu}_e$  ( $^{16}O^{18}O$ )?

$$v = c \bar{\nu}_e ; \quad \bar{\nu}_e = \frac{1}{2\pi} \sqrt{\frac{k_e}{\mu}} \frac{1}{c} ; \quad 1580 = \frac{1}{2\pi c} \sqrt{\frac{k_e}{\mu_1}}$$

$$\mu = \frac{m_a \cdot m_b}{m_a + m_b} \quad \mu(O_2) = \frac{16 \cdot 16}{32} = 8$$

$$\bar{\nu}_e = \frac{1}{2\pi c} \sqrt{\frac{k_e}{\mu_2}}$$

$$\mu(^{16}O^{18}O) = \frac{16 \cdot 18}{34} = 8,47$$

$$\frac{1580}{\bar{\nu}_e} = \frac{\sqrt{\mu_2}}{\sqrt{\mu_1}} ; \quad \bar{\nu}_e(B) = \frac{1580 \cdot \sqrt{8}}{\sqrt{8,47}}$$

c) 1535  $\text{cm}^{-1}$  ✓

$J \rightarrow E=0$   
 $J(J+1)$

$h\nu$   $v=0$  !!!

8. Estat de mínima  $E \rightarrow E_{rot} = 0$ ;  $E_{vib} > 0$  !!  $T=0K$  (B)

9.  $ET = 1$  mode normal i rotes  $\Delta$   $\bar{\nu}_e$   $\rightarrow$  imaginària!! c) ✓

10. ~~11)  $E_{rot} = 2 = 0$  !! Note.~~

$$J=1$$

$$E_{rot} = h B_e J(J+1) = 2hB_e$$

$$d = 2J + 1 = 3 \text{ (C) } \checkmark$$

12. m.n.v. degenerats =  $\sqrt{e}$  (B) ✓

13.  $\Phi_i \xrightarrow{h\nu} \Phi_f$   
 $E_i \xrightarrow{h\nu} E_f$   
1.  $|E_f - E_i| = h\nu$   
2.  $\langle \Phi_f | \hat{d}_a | \Phi_i \rangle \neq 0$  } (C) ✓

(14?)

15.  $Re(HCN)$  lineal  $3N-6 = 3$  (U) (B) ✓  
 $3N-5 = 4$  m.n.v.

$$\mu = \frac{1 \cdot 127}{128} = 0,992$$

$$\mu = \frac{2 \cdot 127}{129} = 1,967$$

$$\bar{\nu}_{D_1} = \frac{1}{2\pi} \sqrt{\frac{k_e}{\mu_{D_1}}} \rightarrow \bar{\nu}_{D_1} = \bar{\nu}_{H_1} \cdot \sqrt{\frac{\mu_{H_1}}{\mu_{D_1}}} = \sqrt{\frac{1}{2}} \bar{\nu}_{H_1}$$

$$\bar{\nu}_{H_1} = \frac{1}{2\pi} \sqrt{\frac{k_e}{\mu_{H_1}}}$$

(A)  $\downarrow \propto \sqrt{2}$  ✓

12

$$\bar{\nu}_e = 565 \text{ cm}^{-1}$$

$$\bar{\nu} = \frac{\nu}{c}$$

$$\mu = \frac{1.35}{36} = 0.9922$$

$$\bar{\nu}_e = \frac{1}{2\pi} \sqrt{\frac{k_e}{\mu}} \frac{1}{c} \quad ; \quad \sqrt{k_e} = \bar{\nu}_e \cdot 2\pi c \sqrt{\mu}$$

$$k_e = (565 \cdot 100 \text{ m}^{-1} \cdot 2 \cdot \pi \cdot 2.9979 \cdot 10^{10})^2 \cdot \mu \cdot \frac{1.672 \cdot 10^{-27} \text{ kg}}{1 \text{ ma}} \text{ (B)}$$

$$k_e = 18.4 \text{ N/m (B) } \checkmark$$

18

$$3 \cdot 6 - 6 = 12 \text{ m.n.v.}$$

$$F > C \quad \left| \quad C < F \right. \text{ Símbolos}$$

(C)  $\checkmark$

→ 19  $\nu_e$  (C)  $\checkmark$

20

(B)

$$50, \text{ HF} \rightarrow \text{OH} + \text{RR} \checkmark$$

21

(D)

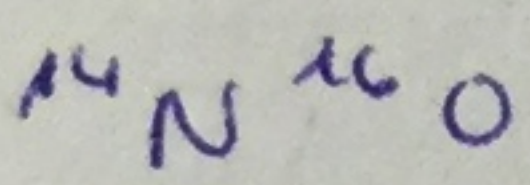
$$D_0 < D_e \checkmark$$

22

$$-m + \nu_e \text{ (A) } \checkmark$$

23

$$J=4 \leftarrow J=3$$



$$d = 1.15 \text{ \AA}$$

$$\nu_{4 \leftarrow 3} = \frac{\Delta E}{h} = \frac{E_{\text{rot}(4)} - E_{\text{rot}(3)}}{h} = \frac{4(4+1) B_e - 3(3+1) B_e}{h}$$

$$\nu_{4 \leftarrow 3} = 8 B_e = \frac{h}{\pi^2 \mu R_e^2} = \frac{6.626 \cdot 10^{-34} \text{ J}\cdot\text{s}}{\pi^2 \left( \frac{14 \cdot 16}{30} \cdot 1.6726 \cdot 10^{-27} \text{ kg} \right) \left( 1.15 \cdot \frac{10^{-10} \text{ m}}{10^{10} \text{ \AA}} \right)^2}$$

$$\nu_e = 4.094 \cdot 10^{12} \text{ s}^{-1}$$

$$\bar{\nu}_e = c \cdot \nu_e \quad ; \quad \bar{\nu} = \frac{4.094 \cdot 10^{12}}{2.9979 \cdot 10^8} = 1355.9 \text{ cm}^{-1} \cdot \frac{10 \text{ m}}{10^8 \text{ cm}}$$

$$\bar{\nu} = 13.55 \text{ cm}^{-1} \text{ (C) } \checkmark$$

24

(A)  $\checkmark$

25 ??

26

+

$\mu$

-

E

(C)  $\checkmark$

27

(D)  $\checkmark$

28

$$\nu = \frac{E_1 - E_2}{h}$$

28

31)  $C_2H_4 \rightarrow 3N-6 = 12$

(A) ✓

32) ~~(D)~~ ✓

33)  $d = 2J+1 = 3$  (C) ✓

34)  $\rightarrow ?$

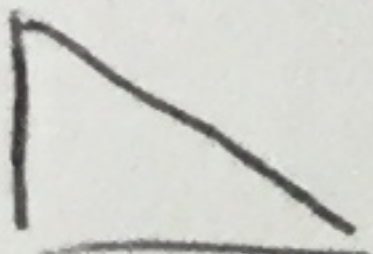
36)  $D_o < D_e$  (A) ✓

37) (B) ✓

38)  $B_u ?$  (B) ✓

39) -

40) (D) ✓

41)   $\phi = 2 \quad h = \sqrt{2^2 + 2^2} = \sqrt{8}$

$V_{n-n} = \frac{1 \cdot 16}{2} \times 2 + \frac{1 \cdot 1}{\sqrt{8}} =$  (A) ✓

42) no lineal  $\rightarrow$  m.n.v: 3 (B) ✓

43.  $E_0 \rightarrow d=1$  |  $\emptyset$  ~~(C)~~ (A)  
 $E_1 \rightarrow d=2$

44.  $2J+1 \rightarrow d=6+1=7$  (D) ✓

45. (B) ✓ 48 (D) ✓

46. (A) ✓ 50 (C) ✓

47? 51 (B) apianet

52) (A) 2B, 4D, 6G

~~53)~~ 56) (B) no p... not  $l_a = l_b = l_c$

58)  $+\nu -\mu$  (B)

59) (B)  $\rightarrow T, nT + \text{poblat. donece}$

60) ?

64) ??

62) D

63) B

Be

U

$\mu_{Be_1} = 2\mu_{Be_2}$

$\frac{h}{8\pi\mu_1 R e^2} = \frac{2h}{\mu_2}$

$\mu_2 = 2\mu_1$

Re

$\mu = 0,9722$

potuc onel  
 $\mu \neq 0$

$v' \uparrow \leftarrow v'' = 0$

Test online

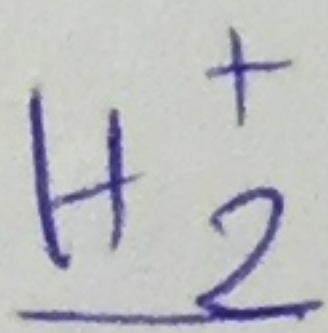
$$a = 1 \text{ nm}$$

$$\left. \begin{aligned} E_1 &= \frac{1^2 h^2}{8ma^2} \\ E_2 &= \frac{4 h^2}{8ma^2} \end{aligned} \right\} \Delta = \frac{E_2 - E_1}{h} = \frac{h(4-1)}{8ma^2} = \frac{3h}{8ma^2} =$$

$$\Delta = \frac{3 \cdot 6,626 \cdot 10^{-34}}{8 \cdot 9,109 \cdot 10^{-31} \text{ kg} \cdot (1 \cdot 10^{-9} \text{ nm})^2} = 2,7278 \cdot 10^{14} \text{ Hz} = 272,78 \cdot 10^{12} \text{ Hz}$$

$$-\frac{1}{2} + \frac{1}{2} = \frac{-1h}{2} = E_{cl}$$

$$D_e = U(\infty) - U(R_e)$$



$$v = \frac{1 \cdot 1}{\infty}$$