1. B
2. A
3. B
4. A
5. B
6. D
7. D
8. B
9. B
10. A
11. B
12. D
13. C
14. D
15. B
16. C
17. A
18. B
19. C
20. A
21. B
22. D
23. A

Short answer #3

E = -2.178x10-18J ((22/52)-(22/32)) = 6.17x10-19J E=hc/λ

6.17x10-19J =((6.626x10-34Js)(3x108m/s))/λ

λ = 322nm

Short answer #4

1. Resonance (aromatic)
2. Resonance (1 double bond)
3. Resonance shortens the bond length since there is alternating single (longer) and double bonds (shorter) and the actual length is the average

Short Answer #5

1. [Ar]4s23d4 (4) or [Ar]4s13d5 (6)
2. [Rn]7s25f4 (4)
3. [Kr]5s24d105p5 (1)

Short Answer #6

Add them up = 109 + 239/2 + 495 – 786 - 349 =

-411.5kJ/mol

Short Answer #7

C-C to C-N = 347 – 305 = +42kJ/mole

Ap Question #1 1987

(a) [any one of these 3]

 (1) It is impossible to determine (or measure) both the position and the momentum of any particle (or object or body) simultaneously.

 (2) The more exactly the position of a particle is known, the less exactly the momentum or velocity of the particle can be known.

 (3) (Δx(Δp) >= *h* or *~~h~~* or *h*/4π, where *h* = Plank’s constant, Δx = uncertainty in position, Δp = uncertainty in momentum.

(b) Bohr postulated that the electron in an H atom travels about the nucleus in a circular orbit and has a fixed angular momentum. With a fixed radius of orbit and a fixed momentum (or energy), (Δx)( Δp)<*h*/4. The Heisenberg principle is violated.

 (c) [either of these 2]

1. The wavelength of a particle is given by the DeBroglie relation λ = *h/mv*. For masses of macroscopic objects, *h/m* is so small for any *v* that λ is too small to be detectable. For an electron, *m* is so small that *h/mv* yields a detectable λ.
2. The product of the uncertainties in position and velocity depends on *h/m* and since *h* is so small (*h* = 6.63×10-34 J∙s), unless *m* is very small as with the electron, the product of the uncertainties is too small to be detected.

Ap Question #2

* 1. Across the period from Li to Ne, the number of protons is increasing in the nucleus. Hence, the nuclear charge is increasing with a consequently stronger attraction for electrons and an increase in ionization energy.
	2. The electron ionized in the case of Be is a 2*s* electron, whereas, in the case of B it is a 2*p* electron. 2*p* electrons are higher in energy than 2*s* electrons because 2*p* electrons penetrate to the core to a lesser degree.
	3. The electron ionized in O is paired with another electron in the same orbital, whereas in N the electron comes from a singly-occupied orbital. The ionization energy of the O electron is less because of the repulsion between the two electrons in the same orbital.

# The ionization energy of Na will be less than those of both Li and Ne because the electron removed comes from an orbital that is farther from the nucleus and, therefore, is less tightly held.

2) CF4 is symmetrical and therefore non-polar even though the individual bonds are polar, but in CH2F2 the molecule is polar because the C-F bonds are not going to balance out the dipole moment since they are on one side of the molecule in the tetrahedral shape.