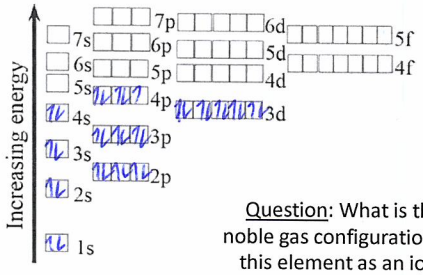
Quantum Theory Practice

For each element:

1. Write *n*, *l* and m_l for the "last" electron.
2. Identify how many electrons have $m_s = +1/2$.
3. Fill in the orbital diagram.
4. Identify if the element is *paramagnetic* or *diamagnetic*.
5. Write the full electron configuration.
6. Write the noble gas configuration.
7. Answer the question for that element.

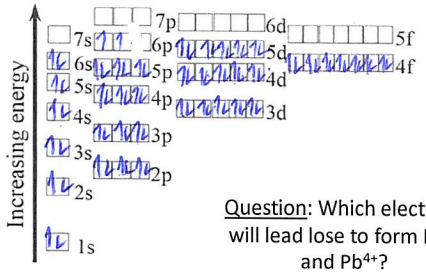
Bromine



Question: What is the noble gas configuration for this element as an ion?

1. $n = 4,\ l = 1,\ m_l = 0$
2. 17 or 18
3. ✓
4. paramagnetic
5. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
6. $[Ar] 4s^2 3d^{10} 4p^5$
7. $[Ar] 4s^2 3d^{10} 4p^6$

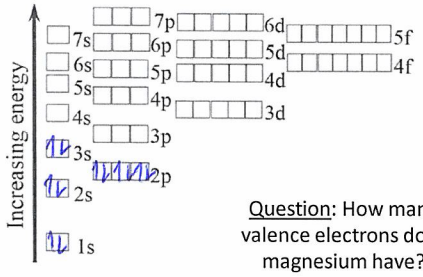
Lead



Question: Which electrons will lead lose to form Pb^{2+} and Pb^{4+}?

1. $n = 6,\ l = 1,\ m_l = 0$
2. 41
4. paramagnetic
5. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$
   $4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^2$
6. $[Xe] 6s^2 4f^{14} 5d^{10} 6p^2$
7. $6p^2$ to form +2
   $6p^2$ and $6s^2$ to form +4

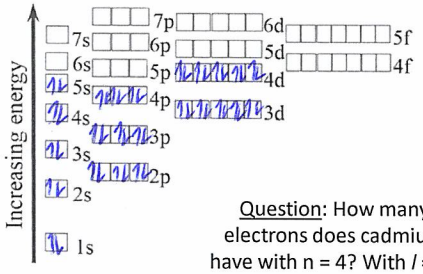
Magnesium



Question: How many valence electrons does magnesium have?

1. $n=3$, $l=0$, $m_l=0$
2. 6
4. diamagnetic
5. $1s^2 2s^2 2p^6 3s^2$
6. $[Ne]\,3s^2$
7. two

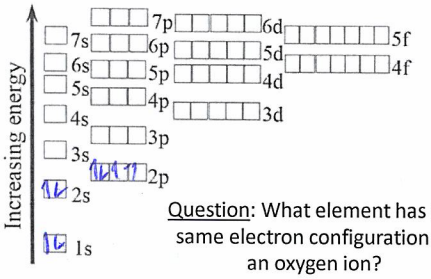
Cadmium



Question: How many electrons does cadmium have with n = 4? With *l* = 1?

1. $n=4$ $l=2$ $m_l=+2$
2. 24
4. diamagnetic
5. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10}$
6. $[Kr]\,5s^2 4d^{10}$
7. 18, 18

Oxygen



Question: What element has the same electron configuration as an oxygen ion?

1. $n=2$, $l=1$, $m_l=-1$
2. 4 or 5
4. paramagnetic
5. $1s^2 2s^2 2p^4$
6. $[He]\,2s^2 2p^4$
7. Neon