

Selenium Chemistry Questions with Solutions

Q1: What are the atomic number and atomic mass of selenium?

Answer:

Atomic Number	34
Atomic Mass	78.91

Q2: What are the chemical properties of selenium?

Answer:

Group	16	Melting point	494 K
Period	4	Boiling point	958 K
Block	p	Density (g cm ⁻³)	4.81 g/cm ³
Atomic number	34		
State at 20°C	Solid		
Electron configuration	[Ar] 3d ¹⁰ 4s ² 4p ⁴		

Q3: Which of the following elements does not belong to group 16 of the periodic table?

- a) Oxygen
- b) Sulphur
- c) Phosphorus
- d) Selenium

Answer: c

Explanation: Oxygen (O), Sulphur (S), Selenium (Se), Tellurium (Te), and Polonium (Po) make up Group 16 of the periodic table. The elements of this group are generally known as the oxygen family after the name of the first member.

Q4: Which group 16 element is the most electronegative?

- a) Sulphur
- b) Oxygen
- c) Polonium
- d) Selenium

Answer: b

Explanation: The electronegativity of the elements in group 16 is higher than that of the ones in group 15. In fact, oxygen (EN=3.5) is the second most electronegative element after fluorine (EN=4.0).

Q5: Which group 16 element has 8 allotropic forms?

- a) Sulphur
- b) Oxygen
- c) Polonium
- d) Selenium

Answer: d

Explanation: There are eight allotropic forms of selenium, three of which are red monoclinic forms with Se_8 rings. Grey hexagonal metallic Selenium, which is made up of polymeric helical chains, is the most thermodynamically stable form.

Q6: Which of the following is a photosensitive element?

- a) Se
- b) S
- c) O
- d) Po

Answer: a

Explanation: Selenium (metallic) and Tellurium (grey) are made up of parallel chains linked together by weak metallic connections. The weak metallic bonds are activated in the presence of light, resulting in an increase in the number of free electrons and thus the conductivity. As a result, these components only conduct electricity in the presence of light. Se and Te are known as photosensitive elements because of this.

Q7: Which of the following element is metalloid?

- a) Selenium.
- b) Tellurium.
- c) Both of these.
- d) None of these.

Answer: c) Both of these.

Explanation: Selenium and tellurium exhibit metalloid characteristics.

Q8: The correct order of reducing property of dioxides are

- a) $\text{TeO}_2 > \text{SeO}_2 > \text{SO}_2$
- b) $\text{SO}_2 > \text{SeO}_2 > \text{TeO}_2$
- c) $\text{SeO}_2 > \text{TeO}_2 > \text{SO}_2$
- d) None of these

Answer: b) $\text{SO}_2 > \text{SeO}_2 > \text{TeO}_2$

Explanation: The tendency of these group 16 elements to be in their higher oxidation state gradually decreases. That is, as the group progresses, the tendency of the elements to become oxidised reduces, and so the reducing characteristic decreases from S to Te.

Q9: Mention the uses of selenium.

Answer:

When used in little quantities in glass, it acts as a decolourizer. It gives the glass a helpful clear red colour in signal lights when used in large quantities. Red enamels for steel and ceramics are also made with it. Also, rubber vulcanization improves abrasion resistance.

Selenium's electrical resistivity varies greatly depending on variables such as temperature and pressure, allotrope nature, impurities, and refining procedure. The majority of metals are insoluble in this element, while non-metallic contaminants raise resistivity.

Q10: How many isotopes of selenium are there? Name them.

Answer:

Six natural isotopes of selenium (${}_{34}\text{Se}$) exist in substantial quantities, as well as the trace isotope ${}^{79}\text{Se}$, which is found in minute amounts in uranium ores. ${}^{74}\text{Se}$, ${}^{76}\text{Se}$, ${}^{77}\text{Se}$, ${}^{78}\text{Se}$, and ${}^{80}\text{Se}$ are the five stable isotopes.

The final three are also fission products, as are ${}^{79}\text{Se}$, which has a half-life of 327,000 years and ${}^{82}\text{Se}$, which has a very long half-life and can be regarded as stable for practical purposes.

There are 23 other unstable isotopes known, the longest of which being ${}^{79}\text{Se}$, which has a half-life of 327,000 years, ${}^{75}\text{Se}$, which has a half-life of 120 days, and ${}^{72}\text{Se}$, which has a half-life of 8.40 days. ${}^{73}\text{Se}$ has the longest half-life of the four isotopes, at 7.15 hours.

Q11: What are the disadvantages of selenium?

Answer:

Selenium is a necessary trace element, but excessive amounts can be hazardous to the environment. Selenium is a hazardous element that is damaging to both the environment and human health in large doses. It also has an impact on our environment.

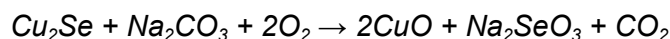
- Selenium is rather safe when taken in doses of less than 400 mcg per day, but it becomes dangerous when used in high doses over an extended period of time.
- Selenium concentrations greater than 400 mcg per day raise the risk of selenium poisoning.

- Low selenium levels for an extended period of time can raise the risk of diabetes.
- Selenium is also responsible for stomach pain, headaches, and rashes.
- Hair loss, exhaustion, nausea, vomiting, and weight loss are all possible side effects of high selenium doses.
- Moreover, extremely high selenium doses might cause organ failure and death.

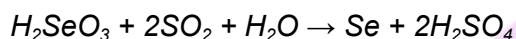
Q12: What are the sources of selenium? Give suitable chemical equations if applicable.

Answer:

Crooksite and clausthalite are minerals that contain selenium. It was made from flue dust from the processing of copper sulphide ores, but electrolytic copper refineries' anode metal is a more prevalent source of selenium. Selenium can be extracted from mud by burning it with soda or sulfuric acid, or by smelting it with soda and niter:



Sulphuric acid is used to acidify the selenite Na_2SeO_3 . Selenous acid, H_2SeO_3 , is formed when tellurites precipitate out of the solution. SO_2 liberates selenium from selenous acid:

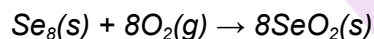


Q13: What happens when

- a) Selenium reacts with oxygen
- b) Selenium reacts with halides

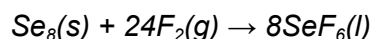
Answer:

a) Reaction with oxygen: Selenium creates solid selenium dioxide when it burns in the air with a blue flame.

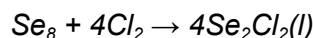


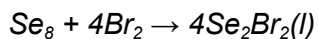
Selenium can also be found as selenium trioxide (SeO_3).

b) Reaction with halides: Selenium reacts with fluorine, F_2 , and burns to produce the selenium hexafluoride.



Diselenium dichloride (Se_2Cl_2) and diselenium dibromide (Se_2Br_2) are formed when selenium interacts with chlorine and bromine.





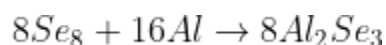
Selenium can also be found in the forms of SeF_4 , SeCl_2 , and SeCl_4 .

Q14: What's the difference between Selenide and Selenite? Give examples.

Answer:

Selenide is a binary compound of selenium or a compound considered binary; such as ethyl selenide. Whereas, Selenite is a salt of selenious acid.

Selenides are formed when selenium reacts with metals. Aluminium selenide, for example.



Selenium reacts to generate selenite salts, such as silver selenite (Ag_2SeO_3) and sodium selenite (Na_2SeO_3).

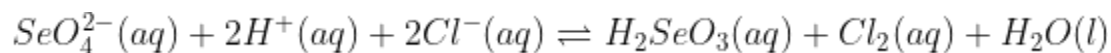
Q15: What happens when Selenium reacts with:

- a) Acids
- b) Halogens
- c) Permanganate
- d) Peroxide
- e) Sulfide
- f) Sulfur dioxide

Answer:

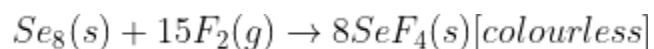
a) Reaction of selenium with acids

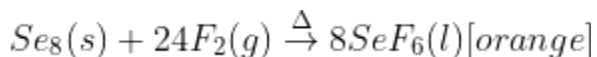
Selenium does not react with non-oxidizing acids in dilute concentrations. Selene(VI) as selenates is oxidised to Selene(VI) by strong hydrochloric acid.



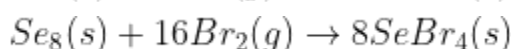
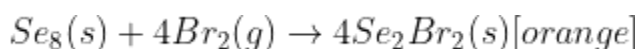
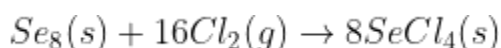
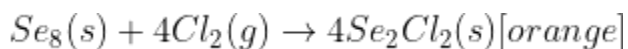
b) Reaction of selenium with halogens

F_2 is formed when selenium combines with fluorine. Selenium(IV) fluoride is created at 0°C , and selenium(VI) fluoride is formed when it is burned:

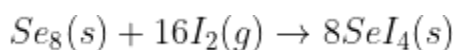




Selenium interacts with chlorine, Cl_2 , and bromine, Br_2 , to generate the Se(II) and Se(IV) halides, depending on the conditions:

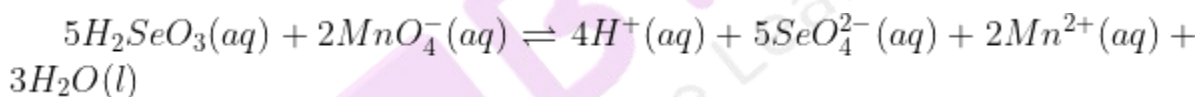


Iodine, I_2 , interacts with selenium to generate Se(IV) iodide:



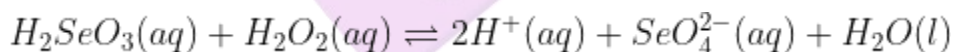
c) Reaction of selenium with permanganate

Permanganate oxidises Selene(IV) as selenious acid to selenic acid.



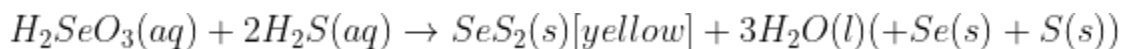
d) Reaction of selenium with peroxide

Hydrogen peroxide oxidises Selene(IV) as selenious acid to selenic acid.



e) Reaction of selenium with sulfide

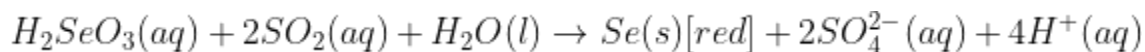
In 0.4M hydrochloric acid, hydrogen sulphide precipitates Selene(IV) as selenious acid. SeS_2 is the most common yellow precipitate, however, it can also be a combination of Se and S or all three components.



Selene(VI) as selenic acid is not precipitated by sulfide.

f) Reaction of selenium with sulfur dioxide

Sulfur dioxide with hydrochloric acid reduces Selene(IV) as selenious acid.



Practise Questions on Selenium

Q1: Describe selenium's property of photoconductivity.

Answer:

The ability of selenium to convert light energy into electrical energy improves as the light intensity rises.

Q2: Does selenium react with hydrogen? If so what compound is produced?

Answer:

Yes, selenium reacts with hydrogen to produce H_2Se or hydrogen selenide.

Q3: What are some common uses for selenium?

Answer:

Selenium is used in the glassmaking and electronics industries. Photocells, solar cells, photocopiers, laser printers, and photographic toners all use it.

Q4: Describe selenium's purpose as a trace element.

Answer:

Selenium is essential for plant and animal health, but it is only safe in modest doses. Selenium in excess can be poisonous and lead to major health concerns.

Q5: Does selenium react with oxygen?

Answer:

Selenium burns in the presence of oxygen to produce selenium dioxide. It can also produce selenium trioxide.