

Name: _____

Grade: _____

Section: _____



AWARENESS CALCULATOR

Encircle the letter that best answers the questions.

1. Are you knowledgeable about water pollution?

- a. Yes b. No

2. If yes, on which of the following platforms have you heard about water pollution? Select all that apply:

- a. Television d. Internet
b. Radio e. School
c. Newspaper f. Others

3. On a scale of 1-5, 1 being the highest, how bad do you think water pollution is?

- a. 1 d. 4
b. 2 e. 5
c. 3

4. How badly do you pollute?

- a. Not at all d. A little
b. Not very much e. A lot
c. Decently

5. Have you been affected by water pollution?

- a. Yes
b. No
c. Not that I know of

6. Do you think water pollution affects your personal health and safety?

- a. Yes
b. No
c. I'm not sure

7. On a scale of 1-5, 1 being the highest, how bad do you think water pollution causes sickness?

- a. 1 b. 2 c. 3 d. 4 e. 5

8. How concerned are you with all types of pollution (soil, air, noise, water)?

- a. Extremely concerned d. Unconcerned
b. Concerned e. Extremely unconcerned
c. Neutral

9. Are you aware of your country's laws to reduce water pollution?

- a. Yes b. No c. Just a bit

10. Do you believe your government is putting up too much effort, money, and resources to eliminate pollution?

- a. No, they are not doing enough c. Yes, they are
b. No, they can do more d. No idea

11. Do you believe that addressing environmental pollution should be the most important factor to consider?

- a. Yes, that is the most critical issue that must be addressed
b. Yes, it is as critical as a few other concerns
c. Neutral
d. No, there are more pressing matters to address



SCORING INSTRUCTIONS:

For numbers 1, 3-11, compute your overall awareness by giving your answers these corresponding scores: A = 1 point, B = 2 points C = 3 points, D = 4 points, and E = 5 points. For number 2, add 1 point each to each item encircled.

13-16 Points:

Wow! Seems like you're doing your part pretty great!

17-20 Points:

Thank you for trying to do your part!

21-30 Points:

Long way to go, but almost there!

31-40 Points:

You can always do better!

41-46 Points:

It's about time to learn more about water pollution and its effects. You can do it!



AN ODE TO NATURE

Water pollution develops when water bodies get contaminated as a result of human activity. However, it can also be a result of chemicals being discharged by factories, farms, cars, and other causes of pollution. As a student, what are the ways that you can do to prevent or reduce water pollution? Express your thoughts through a poem. Be creative!



DID YOU KNOW

Humans and many other living things cannot use more than 99 percent of the water on the planet. Only around 1% of the water on Earth is drinkable, and a rise in water pollution can have a significant impact on marine life and habitats. Countries without access to safe drinking water are pushed to drink untreated water, making them vulnerable to water-borne diseases that harm their health.



Periodic Table of Elements

Group 1			
Period 1	1.008 1312.0 2.20 H Hydrogen 1s ¹		
2	6.94 520.2 0.98 Li Lithium 1s ² 2s ¹	9.0122 899.5 1.57 Be Beryllium 1s ² 2s ²	
3	22.990 495.8 0.93 Na Sodium [Ne] 3s ¹	24.305 737.7 1.31 Mg Magnesium [Ne] 3s ²	
4	39.098 418.8 0.82 K Potassium [Ar] 4s ¹	40.078 589.8 1.00 Ca Calcium [Ar] 4s ²	44.956 633.1 1.36 Sc Scandium [Ar] 3d ¹ 4s ²
5	85.468 403.0 0.82 Rb Rubidium [Kr] 5s ¹	87.62 549.5 0.95 Sr Strontium [Kr] 5s ²	88.906 600.0 1.22 Y Yttrium [Kr] 4d ¹ 5s ²
6	132.91 375.7 0.79 Cs Cæesium [Xe] 6s ¹	137.33 502.9 0.89 Ba Barium [Xe] 6s ²	138.91 538.1 1.10 La Lanthanum [Xe] 5d ¹ 6s ²
7	(223) 380.0 0.70 Fr Francium [Rn] 7s ¹	(226) 509.3 0.90 Ra Radium [Rn] 7s ²	(227) 499.0 1.10 Ac Actinium [Rn] 6d ¹ 7s ²

standard atomic weight or most stable mass number: 55.845

1st ionization energy in kJ/mol: 762.5

chemical symbol: **Fe**

name: Iron

electron configuration: [Ar] 3d⁶ 4s²

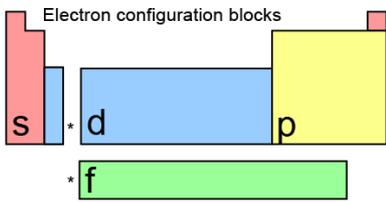
atomic number: 26

electronegativity: 1.83

oxidation states most common are bold: +6, +5, +4, +3, +2, +1, -1, -2

radioactive elements have masses in parenthesis

4	5	6	7	8	9
47.867 658.8 1.54 Ti Titanium [Ar] 3d ² 4s ²	50.942 650.9 1.63 V Vanadium [Ar] 3d ³ 4s ²	51.996 652.9 1.66 Cr Chromium [Ar] 3d ⁵ 4s ¹	54.938 717.3 1.55 Mn Manganese [Ar] 3d ⁵ 4s ²	55.845 762.5 1.83 Fe Iron [Ar] 3d ⁶ 4s ²	58.933 760.4 1.91 Co Cobalt [Ar] 3d ⁷ 4s ²
91.224 640.1 1.33 Zr Zirconium [Kr] 4d ² 5s ²	92.906 652.1 1.60 Nb Niobium [Kr] 4d ⁴ 5s ¹	95.95 684.3 2.16 Mo Molybdenum [Kr] 4d ⁵ 5s ¹	(98) 702.0 1.90 Tc Technetium [Kr] 4d ⁵ 5s ²	101.07 710.2 2.20 Ru Ruthenium [Kr] 4d ⁷ 5s ¹	102.91 719.7 2.28 Rh Rhodium [Kr] 4d ⁸ 5s ¹
178.49 658.5 1.30 Hf Hafnium [Xe] 4f ¹⁴ 5d ² 6s ²	180.95 761.0 1.50 Ta Tantalum [Xe] 4f ¹⁴ 5d ³ 6s ²	183.84 770.0 2.36 W Tungsten [Xe] 4f ¹⁴ 5d ⁴ 6s ²	186.21 760.0 1.90 Re Rhenium [Xe] 4f ¹⁴ 5d ⁵ 6s ²	190.23 840.0 2.20 Os Osmium [Xe] 4f ¹⁴ 5d ⁶ 6s ²	192.22 880.0 2.20 Ir Iridium [Xe] 4f ¹⁴ 5d ⁷ 6s ²
(261) 580.0 Rf Rutherfordium [Rn] 5f ¹⁴ 6d ² 7s ²	(262) Db Dubnium [Rn] 5f ¹⁴ 6d ³ 7s ²	(266) Sg Seaborgium [Rn] 5f ¹⁴ 6d ⁴ 7s ²	(264) Bh Bohrium [Rn] 5f ¹⁴ 6d ⁵ 7s ²	(277) Hs Hassium [Rn] 5f ¹⁴ 6d ⁶ 7s ²	(268) Mt Meitnerium [Rn] 5f ¹⁴ 6d ⁷ 7s ²



Notes

- 1 kJ/mol ≈ 96.485 eV
- all elements are implied to have an oxidation state of zero.

by Robert Campion / updated 2016, 2018

140.12 534.4 1.12 Ce Cerium [Xe] 4f ¹ 5d ¹ 6s ²	140.91 527.0 1.13 Pr Praseodymium [Xe] 4f ³ 6s ²	144.24 533.1 1.14 Nd Neodymium [Xe] 4f ⁴ 6s ²	(145) 540.0 Pm Promethium [Xe] 4f ⁵ 6s ²	150.36 544.5 1.17 Sm Samarium [Xe] 4f ⁶ 6s ²	151.96 547.1 Eu Europium [Xe] 4f ⁷ 6s ²
232.04 587.0 1.30 Th Thorium [Rn] 6d ² 7s ²	231.04 568.0 1.50 Pa Protactinium [Rn] 5f ² 6d ¹ 7s ²	238.03 597.6 1.38 U Uranium [Rn] 5f ³ 6d ¹ 7s ²	(237) 604.5 1.36 Np Neptunium [Rn] 5f ⁴ 6d ¹ 7s ²	(244) 584.7 1.28 Pu Plutonium [Rn] 5f ⁶ 7s ²	(243) 578.0 1.30 Am Americium [Rn] 5f ⁷ 7s ²

alkali metals (red) alkaline earth metals (orange) lanthanides (light purple) transition metals (pink) unknown properties (grey)

actinides (dark pink)

2012rc. (2009, December 15). Periodic Table of the Elements [Image]. Wikimedia Commons. Retrieved on October 14, 2021 from https://commons.wikimedia.org/wiki/File:Periodic_table_large.svg

of the Elements

																				18					
																				4.0026 2372.3		2			
																				He Helium 1s ²					
										13		14		15		16		17							
										10.81 800.6 2.04		12.011 1086.5 2.55		14.007 1402.3 3.04		15.999 1313.9 3.44		18.998 1681.0 3.98		20.180 2080.7		10			
										B Boron 1s ² 2s ² 2p ¹		C Carbon 1s ² 2s ² 2p ²		N Nitrogen 1s ² 2s ² 2p ³		O Oxygen 1s ² 2s ² 2p ⁴		F Fluorine 1s ² 2s ² 2p ⁵		Ne Neon 1s ² 2s ² 2p ⁶					
										26.982 577.5 1.61		28.085 786.5 1.90		30.974 1011.8		32.06 999.6 2.58		35.45 1251.2 3.16		39.948 1520.6		18			
										Al Aluminium [Ne] 3s ² 3p ¹		Si Silicon [Ne] 3s ² 3p ²		P Phosphorus [Ne] 3s ² 3p ³		S Sulfur [Ne] 3s ² 3p ⁴		Cl Chlorine [Ne] 3s ² 3p ⁵		Ar Argon [Ne] 3s ² 3p ⁶					
10		11		12																					
58.693 737.1 1.88		63.546 745.5 1.90		65.38 906.4 1.65		69.723 578.8 1.81		72.630 762.0 2.01		74.922 947.0 2.18		78.971 941.0 2.55		79.904 1139.9 2.96		83.798 1350.8 3.00		36							
Ni Nickel [Ar] 3d ⁸ 4s ²		Cu Copper [Ar] 3d ¹⁰ 4s ¹		Zn Zinc [Ar] 3d ¹⁰ 4s ²		Ga Gallium [Ar] 3d ¹⁰ 4s ² 4p ¹		Ge Germanium [Ar] 3d ¹⁰ 4s ² 4p ²		As Arsenic [Ar] 3d ¹⁰ 4s ² 4p ³		Se Selenium [Ar] 3d ¹⁰ 4s ² 4p ⁴		Br Bromine [Ar] 3d ¹⁰ 4s ² 4p ⁵		Kr Krypton [Ar] 3d ¹⁰ 4s ² 4p ⁶									
106.42 804.4 2.20		107.87 731.0 1.93		112.41 867.8 1.69		114.82 558.3 1.78		118.71 708.6 1.96		121.76 834.0 2.05		127.60 869.3 2.10		126.90 1008.4 2.66		131.29 1170.4 2.60		54							
Pd Palladium [Kr] 4d ¹⁰		Ag Silver [Kr] 4d ¹⁰ 5s ¹		Cd Cadmium [Kr] 4d ¹⁰ 5s ²		In Indium [Kr] 4d ¹⁰ 5s ² 5p ¹		Sn Tin [Kr] 4d ¹⁰ 5s ² 5p ²		Sb Antimony [Kr] 4d ¹⁰ 5s ² 5p ³		Te Tellurium [Kr] 4d ¹⁰ 5s ² 5p ⁴		I Iodine [Kr] 4d ¹⁰ 5s ² 5p ⁵		Xe Xenon [Kr] 4d ¹⁰ 5s ² 5p ⁶									
195.08 870.0 2.28		196.97 890.1 2.54		200.59 1007.1 2.00		204.38 589.4 1.62		207.2 715.6 2.33		208.98 703.0 2.02		(210) 812.1 2.00		(210) 890.0 2.20		(220) 1037.0		86							
Pt Platinum [Xe] 4f ¹⁴ 5d ⁹ 6s ¹		Au Gold [Xe] 4f ¹⁴ 5d ¹⁰ 6s ¹		Hg Mercury [Xe] 4f ¹⁴ 5d ¹⁰ 6s ²		Tl Thallium [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ¹		Pb Lead [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ²		Bi Bismuth [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ³		Po Polonium [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁴		At Astatine [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁵		Rn Radon [Xe] 4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁶									
(271) 110		(272) 111		(285) 112		(284) 113		(289) 114		(288) 115		(292) 116		(294) 117		(294) 118									
Ds Darmstadtium		Rg Roentgenium		Cn Copernicium		Nh Nihonium		Fl Flerovium		Mc Moscovium		Lv Livermorium		Ts Tennessine		Og Oganesson									

157.25 593.4 1.20		158.93 565.8		162.50 573.0 1.22		164.93 581.0 1.23		167.25 589.3 1.24		168.93 596.7 1.25		173.05 603.4		174.97 523.5 1.27	
Gd Gadolinium [Xe] 4f ⁷ 5d ¹ 6s ²		Tb Terbium [Xe] 4f ⁹ 6s ²		Dy Dysprosium [Xe] 4f ¹⁰ 6s ²		Ho Holmium [Xe] 4f ¹¹ 6s ²		Er Erbium [Xe] 4f ¹² 6s ²		Tm Thulium [Xe] 4f ¹³ 6s ²		Yb Ytterbium [Xe] 4f ¹⁴ 6s ²		Lu Lutetium [Xe] 4f ¹⁴ 5d ¹ 6s ²	
(247) 96		(247) 97		(251) 98		(252) 99		(257) 100		(258) 101		(259) 102		(262) 103	
581.0 1.30		601.0 1.30		608.0 1.30		619.0 1.30		627.0 1.30		635.0 1.30		642.0 1.30		470.0	
Cm Curium [Rn] 5f ⁷ 6d ¹ 7s ²		Bk Berkelium [Rn] 5f ⁹ 7s ²		Cf Californium [Rn] 5f ¹⁰ 7s ²		Es Einsteinium [Rn] 5f ¹¹ 6s ²		Fm Fermium [Rn] 5f ¹² 7s ²		Md Mendelevium [Rn] 5f ¹³ 7s ²		No Nobelium [Rn] 5f ¹⁴ 7s ²		Lr Lawrencium [Rn] 5f ¹⁴ 7s ² 7p ¹	

post-transition metals
 metalloids
 reactive nonmetals
 noble gases



WATER FILTRATION EXPERIMENT

Materials:

- 2 liters of "dirty" natural water
- 3 litres of clean water
- 1 two-litre plastic soda bottle with cap
- 2 two-litre plastic soda bottles (one with its bottom cut off and one with the top cut off)
- 1 large beaker
- 2 tablespoons of alum
- 1 ½ cups fine sand
- 1 ½ cups coarse sand
- 1 cup small pebbles
- 1 coffee filter
- 1 rubber band
- Spoon

Procedure:

1. Fill the bottle with dirty water
2. Shake the bottle vigorously for 30 seconds. Pour the water back and forth into another bottle about 10 times to continue the aeration process.
3. Pour your aerated water into the bottle with its top cut off.
4. Add 2 tablespoons of alum to the aerated water. Slowly stir for 5 minutes.
5. Allow the water in the container to sit undisturbed. For a total of 20 minutes, observe at five-minute intervals.
6. Construct a filter as follows:
 - 6a. Using a rubber band, secure the coffee filter to the bottle's outside neck. Invert the bottle and place it in a beaker. Fill the bottle halfway with pebbles.
 - 6b. Pour the coarse sand on top of the pebbles.
 - 6c. Pour the fine sand on top of the coarse sand.
 - 6d. Pour 3 litres (or more) of clean drinking water through the filter slowly and carefully to clean it. The water that has passed through the filter should be discarded.
7. After a large amount of sediment has settled on the bottom of the bottle of the dirty water, carefully pour the water through the filter. Collect the filtered water in the beaker or plastic bottle.

Observations:

1. Why do you think it's important to aerate the water?

2. What is the role of the alum powder in clarifying the water?

3. Why is it necessary to put pebbles, coarse sand, and fine sand on your homemade filter?

