

Chemistry Assignment

The assignment was solved with Java. The tasks consisted of calculating different densities of atoms. You will find my code on my GitHub account. Here is the link:

<https://github.com/jonasbrunvoll/Chemistry>.

I have tried to explain my code through comments, but there are some small things I would like to point out. After discussing with my classmates, I have chosen to use the middle point value of the calculated radius and the empirical radius when I calculated the densities. This because the middle point gave results much closer to the densities in the numeric densities table. You do find the calculations for the density using calculated and empirical radius at the bottom of the Main.js file, commented out.

I will also point out that I chose to use the zetta atom values from the numeric densities table to calculate task two of the assignment. This because the values I got from calculating the values middle values from the AtomicRadii table was not consistent enough. Also here the calculation for the middle values are commented out at the bottom of the Main.js file.

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Task 1

prints out the density per mol (gram/cm³) In ascending order by atom number and the difference between the calculated density and the density from the table.

Task 2

Prints out zetta atoms per mol (gram / cm³) in ascending order by atom number and the difference between the calculated density and the density from the table.

The following screenshots are the results from both task 1 and task 2.

Task1__Calculate the density using Middle Point Value of calculated and empirical radius

1.	Density = 0,841213 g/cm ³	Error: 0,841123 g/cm ³
2.	Density = 0,460794 g/cm ³	Error: 0,460615 g/cm ³
3.	Density = 0,090598 g/cm ³	Error: 0,443402 g/cm ³
4.	Density = 0,349625 g/cm ³	Error: 1,500375 g/cm ³
5.	Density = 0,842250 g/cm ³	Error: 1,497750 g/cm ³
6.	Density = 1,851731 g/cm ³	Error: 1,661269 g/cm ³
7.	Density = 3,134365 g/cm ³	Error: 0,867365 g/cm ³
8.	Density = 5,034798 g/cm ³	Error: 5,033548 g/cm ³
9.	Density = 9,671746 g/cm ³	Error: 9,670317 g/cm ³
10.	Density = 1,030590 g/cm ³	Error: 1,028894 g/cm ³
11.	Density = 0,179926 g/cm ³	Error: 0,179026 g/cm ³
12.	Density = 0,375310 g/cm ³	Error: 0,595690 g/cm ³
13.	Density = 0,745445 g/cm ³	Error: 0,992555 g/cm ³
14.	Density = 1,031510 g/cm ³	Error: 1,666490 g/cm ³
15.	Density = 1,581839 g/cm ³	Error: 0,747761 g/cm ³
16.	Density = 1,588919 g/cm ³	Error: 0,231081 g/cm ³
17.	Density = 2,450498 g/cm ³	Error: 0,383498 g/cm ³
18.	Density = 5,530832 g/cm ³	Error: 5,527618 g/cm ³
19.	Density = 0,156161 g/cm ³	Error: 0,154377 g/cm ³
20.	Density = 0,303705 g/cm ³	Error: 0,558295 g/cm ³
21.	Density = 0,437797 g/cm ³	Error: 1,102203 g/cm ³
22.	Density = 0,601361 g/cm ³	Error: 2,387639 g/cm ³
23.	Density = 0,704810 g/cm ³	Error: 3,835190 g/cm ³
24.	Density = 0,719393 g/cm ³	Error: 5,390607 g/cm ³
25.	Density = 0,798608 g/cm ³	Error: 6,351392 g/cm ³
26.	Density = 0,853630 g/cm ³	Error: 6,586370 g/cm ³
27.	Density = 0,988265 g/cm ³	Error: 6,885735 g/cm ³
28.	Density = 1,015762 g/cm ³	Error: 7,844238 g/cm ³
29.	Density = 1,147558 g/cm ³	Error: 7,764442 g/cm ³
30.	Density = 1,219456 g/cm ³	Error: 7,740544 g/cm ³
31.	Density = 1,468560 g/cm ³	Error: 5,665440 g/cm ³
32.	Density = 1,842962 g/cm ³	Error: 4,064038 g/cm ³
33.	Density = 2,473224 g/cm ³	Error: 2,849776 g/cm ³
34.	Density = 3,021330 g/cm ³	Error: 2,754670 g/cm ³
35.	Density = 3,469686 g/cm ³	Error: 1,339314 g/cm ³
36.	Density = 50,447121 g/cm ³	Error: 47,325121 g/cm ³
37.	Density = 0,271053 g/cm ³	Error: 0,267320 g/cm ³
38.	Density = 0,472195 g/cm ³	Error: 1,059805 g/cm ³
39.	Density = 0,585104 g/cm ³	Error: 2,054896 g/cm ³
40.	Density = 0,768684 g/cm ³	Error: 3,700316 g/cm ³
41.	Density = 0,912687 g/cm ³	Error: 5,593313 g/cm ³
42.	Density = 1,011850 g/cm ³	Error: 7,558150 g/cm ³
43.	Density = 1,208106 g/cm ³	Error: 9,011894 g/cm ³
44.	Density = 1,371294 g/cm ³	Error: 10,128706 g/cm ³
45.	Density = 1,396205 g/cm ³	Error: 10,973795 g/cm ³

46.	Density = 1,429909 g/cm ³	Error: 10,980091 g/cm ³
47.	Density = 1,245670 g/cm ³	Error: 10,774330 g/cm ³
48.	Density = 1,412239 g/cm ³	Error: 9,088761 g/cm ³
49.	Density = 1,513175 g/cm ³	Error: 7,176825 g/cm ³
50.	Density = 1,929540 g/cm ³	Error: 5,380460 g/cm ³
51.	Density = 2,246626 g/cm ³	Error: 5,040374 g/cm ³
52.	Density = 2,780635 g/cm ³	Error: 3,904365 g/cm ³
53.	Density = 3,033998 g/cm ³	Error: 3,198002 g/cm ³
54.	Density = 42,486478 g/cm ³	Error: 37,556478 g/cm ³
55.	Density = 0,303249 g/cm ³	Error: 0,297362 g/cm ³
56.	Density = 0,531103 g/cm ³	Error: 1,341897 g/cm ³
57.	Density = 0,928292 g/cm ³	Error: 2,665708 g/cm ³
58.	Density = 1,376467 g/cm ³	Error: 4,768533 g/cm ³
59.	Density = 0,692859 g/cm ³	Error: 6,077141 g/cm ³
60.	Density = 0,956581 g/cm ³	Error: 5,816419 g/cm ³
61.	Density = 0,969024 g/cm ³	Error: 6,037976 g/cm ³
62.	Density = 0,787538 g/cm ³	Error: 6,472462 g/cm ³
63.	Density = 0,836799 g/cm ³	Error: 6,683201 g/cm ³
64.	Density = 0,884914 g/cm ³	Error: 4,358086 g/cm ³
65.	Density = 0,984403 g/cm ³	Error: 6,910597 g/cm ³
66.	Density = 0,984235 g/cm ³	Error: 7,244765 g/cm ³
67.	Density = 1,013974 g/cm ³	Error: 7,536026 g/cm ³
68.	Density = 1,028293 g/cm ³	Error: 7,766707 g/cm ³
69.	Density = 1,070301 g/cm ³	Error: 7,995699 g/cm ³
70.	Density = 1,096404 g/cm ³	Error: 8,224596 g/cm ³
71.	Density = 1,151485 g/cm ³	Error: 5,813515 g/cm ³
72.	Density = 1,479294 g/cm ³	Error: 8,360706 g/cm ³
73.	Density = 1,746856 g/cm ³	Error: 11,563144 g/cm ³
74.	Density = 2,065280 g/cm ³	Error: 14,588720 g/cm ³
75.	Density = 2,190529 g/cm ³	Error: 17,059471 g/cm ³
76.	Density = 2,412725 g/cm ³	Error: 18,607275 g/cm ³
77.	Density = 2,437927 g/cm ³	Error: 20,172073 g/cm ³
78.	Density = 2,546352 g/cm ³	Error: 20,103648 g/cm ³
79.	Density = 2,646540 g/cm ³	Error: 18,813460 g/cm ³
80.	Density = 2,404112 g/cm ³	Error: 16,877888 g/cm ³
81.	Density = 1,956037 g/cm ³	Error: 11,577563 g/cm ³
82.	Density = 2,204504 g/cm ³	Error: 9,645496 g/cm ³
83.	Density = 2,978087 g/cm ³	Error: 8,363913 g/cm ³
84.	Density = 2,425100 g/cm ³	Error: 7,381900 g/cm ³
85.	Density = 41,616749 g/cm ³	Error: 32,296749 g/cm ³
86.	Density = 52,224294 g/cm ³	Error: 45,224294 g/cm ³
87.	Unknown.	
88.	Density = 9,141714 g/cm ³	Error: 7,271714 g/cm ³
89.	Density = 12,324836 g/cm ³	Error: 6,824836 g/cm ³
90.	Density = 16,038380 g/cm ³	Error: 5,968380 g/cm ³
91.	Density = 15,969122 g/cm ³	Error: 4,249122 g/cm ³

92.	Density = 17,911940 g/cm ³	Error: 2,541940 g/cm ³
93.	Density = 17,834506 g/cm ³	Error: 1,115494 g/cm ³
94.	Density = 18,361264 g/cm ³	Error: 2,088736 g/cm ³
95.	Density = 18,286013 g/cm ³	Error: 1,529987 g/cm ³
96.	Unknown.	
97.	Unknown.	
98.	Unknown.	
99.	Unknown.	
100.	Unknown.	
101.	Unknown.	
102.	Unknown.	
103.	Unknown.	
104.	Unknown.	
105.	Unknown.	
106.	Unknown.	
107.	Unknown.	
108.	Unknown.	
109.	Unknown.	
110.	Unknown.	
111.	Unknown.	
112.	Unknown.	
113.	Unknown.	
114.	Unknown.	
115.	Unknown.	
116.	Unknown.	
117.	Unknown.	
118.	Unknown.	

Task2. Find the distance between atoms using given Zetta Units

1.	Zetta atomer: 0,053749 Atoms/cm ³ .	Error: 0,000251 Atoms/cm ³
2.	Zetta atomer: 0,026860 Atoms/cm ³ .	Error: 0,000140 Atoms/cm ³
3.	Zetta atomer: 46,329751 Atoms/cm ³ .	Error: 0,001249 Atoms/cm ³
4.	Zetta atomer: 123,620728 Atoms/cm ³ .	Error: 0,000272 Atoms/cm ³
5.	Zetta atomer: 130,343909 Atoms/cm ³ .	Error: 112,199909 Atoms/cm ³
6.	Zetta atomer: 176,132595 Atoms/cm ³ .	Error: 62,465595 Atoms/cm ³
7.	Zetta atomer: 97,464653 Atoms/cm ³ .	Error: 47,512653 Atoms/cm ³
8.	Zetta atomer: 0,047072 Atoms/cm ³ .	Error: 0,006928 Atoms/cm ³
9.	Zetta atomer: 0,045297 Atoms/cm ³ .	Error: 0,008703 Atoms/cm ³
10.	Zetta atomer: 0,050611 Atoms/cm ³ .	Error: 0,003389 Atoms/cm ³
11.	Zetta atomer: 0,023572 Atoms/cm ³ .	Error: 0,003428 Atoms/cm ³
12.	Zetta atomer: 24,058268 Atoms/cm ³ .	Error: 1,376732 Atoms/cm ³
13.	Zetta atomer: 38,789697 Atoms/cm ³ .	Error: 4,273303 Atoms/cm ³
14.	Zetta atomer: 57,848594 Atoms/cm ³ .	Error: 17,808594 Atoms/cm ³
15.	Zetta atomer: 45,292346 Atoms/cm ³ .	Error: 85,054654 Atoms/cm ³
16.	Zetta atomer: 34,180695 Atoms/cm ³ .	Error: 1,205305 Atoms/cm ³
17.	Zetta atomer: 35,109790 Atoms/cm ³ .	Error: 3,710210 Atoms/cm ³
18.	Zetta atomer: 0,048450 Atoms/cm ³ .	Error: 0,006550 Atoms/cm ³
19.	Zetta atomer: 0,027473 Atoms/cm ³ .	Error: 0,000473 Atoms/cm ³
20.	Zetta atomer: 12,952153 Atoms/cm ³ .	Error: 0,324847 Atoms/cm ³
21.	Zetta atomer: 20,628793 Atoms/cm ³ .	Error: 2,511207 Atoms/cm ³
22.	Zetta atomer: 37,603689 Atoms/cm ³ .	Error: 14,073689 Atoms/cm ³
23.	Zetta atomer: 53,668643 Atoms/cm ³ .	Error: 3,449357 Atoms/cm ³
24.	Zetta atomer: 70,763943 Atoms/cm ³ .	Error: 1,466057 Atoms/cm ³
25.	Zetta atomer: 78,374349 Atoms/cm ³ .	Error: 4,436651 Atoms/cm ³
26.	Zetta atomer: 80,228633 Atoms/cm ³ .	Error: 1,326367 Atoms/cm ³
27.	Zetta atomer: 80,459552 Atoms/cm ³ .	Error: 4,451448 Atoms/cm ³
28.	Zetta atomer: 90,905082 Atoms/cm ³ .	Error: 0,368082 Atoms/cm ³
29.	Zetta atomer: 84,455456 Atoms/cm ³ .	Error: 6,984544 Atoms/cm ³
30.	Zetta atomer: 82,528480 Atoms/cm ³ .	Error: 2,383520 Atoms/cm ³
31.	Zetta atomer: 61,616609 Atoms/cm ³ .	Error: 4,065391 Atoms/cm ³
32.	Zetta atomer: 48,970201 Atoms/cm ³ .	Error: 2,049799 Atoms/cm ³
33.	Zetta atomer: 42,784637 Atoms/cm ³ .	Error: 1,345363 Atoms/cm ³
34.	Zetta atomer: 44,051510 Atoms/cm ³ .	Error: 2,375490 Atoms/cm ³
35.	Zetta atomer: 36,243239 Atoms/cm ³ .	Error: 0,433761 Atoms/cm ³
36.	Zetta atomer: 22,435719 Atoms/cm ³ .	Error: 153,705281 Atoms/cm ³
37.	Zetta atomer: 0,026302 Atoms/cm ³ .	Error: 0,000698 Atoms/cm ³
38.	Zetta atomer: 10,529222 Atoms/cm ³ .	Error: 0,265778 Atoms/cm ³
39.	Zetta atomer: 17,881898 Atoms/cm ³ .	Error: 42,336102 Atoms/cm ³
40.	Zetta atomer: 29,501357 Atoms/cm ³ .	Error: 0,769643 Atoms/cm ³
41.	Zetta atomer: 42,170723 Atoms/cm ³ .	Error: 0,778277 Atoms/cm ³
42.	Zetta atomer: 53,781305 Atoms/cm ³ .	Error: 1,768695 Atoms/cm ³
43.	Zetta atomer: 62,800857 Atoms/cm ³ .	Error: 1,348143 Atoms/cm ³
44.	Zetta atomer: 68,519838 Atoms/cm ³ .	Error: 2,148162 Atoms/cm ³
45.	Zetta atomer: 72,388529 Atoms/cm ³ .	Error: 1,315471 Atoms/cm ³
46.	Zetta atomer: 70,224601 Atoms/cm ³ .	Error: 2,400399 Atoms/cm ³
47.	Zetta atomer: 67,104646 Atoms/cm ³ .	Error: 0,913354 Atoms/cm ³

48.	Zetta atomer: 56,255190 Atoms/cm ³ .	Error: 2,370810 Atoms/cm ³
49.	Zetta atomer: 45,577505 Atoms/cm ³ .	Error: 0,977495 Atoms/cm ³
50.	Zetta atomer: 37,082655 Atoms/cm ³ .	Error: 1,258345 Atoms/cm ³
51.	Zetta atomer: 36,040008 Atoms/cm ³ .	Error: 0,926992 Atoms/cm ³
52.	Zetta atomer: 31,549428 Atoms/cm ³ .	Error: 1,513572 Atoms/cm ³
53.	Zetta atomer: 29,572830 Atoms/cm ³ .	Error: 0,160830 Atoms/cm ³
54.	Zetta atomer: 22,612371 Atoms/cm ³ .	Error: 0,782629 Atoms/cm ³
55.	Zetta atomer: 0,026674 Atoms/cm ³ .	Error: 0,000326 Atoms/cm ³
56.	Zetta atomer: 8,213393 Atoms/cm ³ .	Error: 0,273607 Atoms/cm ³
57.	Zetta atomer: 15,581202 Atoms/cm ³ .	Error: 0,179798 Atoms/cm ³
58.	Zetta atomer: 26,410396 Atoms/cm ³ .	Error: 0,230604 Atoms/cm ³
59.	Zetta atomer: 28,933020 Atoms/cm ³ .	Error: 0,163980 Atoms/cm ³
60.	Zetta atomer: 28,276789 Atoms/cm ³ .	Error: 0,670211 Atoms/cm ³
61.	Zetta atomer: 29,100796 Atoms/cm ³ .	Error: 0,153204 Atoms/cm ³
62.	Zetta atomer: 29,076696 Atoms/cm ³ .	Error: 1,075304 Atoms/cm ³
63.	Zetta atomer: 29,800111 Atoms/cm ³ .	Error: 0,317889 Atoms/cm ³
64.	Zetta atomer: 20,078439 Atoms/cm ³ .	Error: 0,698561 Atoms/cm ³
65.	Zetta atomer: 29,915803 Atoms/cm ³ .	Error: 0,319197 Atoms/cm ³
66.	Zetta atomer: 30,495408 Atoms/cm ³ .	Error: 0,686592 Atoms/cm ³
67.	Zetta atomer: 31,218153 Atoms/cm ³ .	Error: 0,467847 Atoms/cm ³
68.	Zetta atomer: 31,665555 Atoms/cm ³ .	Error: 0,447445 Atoms/cm ³
69.	Zetta atomer: 32,317622 Atoms/cm ³ .	Error: 0,324378 Atoms/cm ³
70.	Zetta atomer: 32,435576 Atoms/cm ³ .	Error: 0,791424 Atoms/cm ³
71.	Zetta atomer: 23,972080 Atoms/cm ³ .	Error: 0,267920 Atoms/cm ³
72.	Zetta atomer: 33,198767 Atoms/cm ³ .	Error: 10,580767 Atoms/cm ³
73.	Zetta atomer: 44,296052 Atoms/cm ³ .	Error: 0,610948 Atoms/cm ³
74.	Zetta atomer: 54,553083 Atoms/cm ³ .	Error: 0,872917 Atoms/cm ³
75.	Zetta atomer: 62,255178 Atoms/cm ³ .	Error: 0,802822 Atoms/cm ³
76.	Zetta atomer: 66,541786 Atoms/cm ³ .	Error: 1,439214 Atoms/cm ³
77.	Zetta atomer: 70,835264 Atoms/cm ³ .	Error: 0,741736 Atoms/cm ³
78.	Zetta atomer: 69,917728 Atoms/cm ³ .	Error: 1,044272 Atoms/cm ³
79.	Zetta atomer: 65,611052 Atoms/cm ³ .	Error: 0,634948 Atoms/cm ³
80.	Zetta atomer: 57,887334 Atoms/cm ³ .	Error: 15,196334 Atoms/cm ³
81.	Zetta atomer: 39,875792 Atoms/cm ³ .	Error: 0,755208 Atoms/cm ³
82.	Zetta atomer: 34,440492 Atoms/cm ³ .	Error: 0,475508 Atoms/cm ³
83.	Zetta atomer: 32,683283 Atoms/cm ³ .	Error: 9,049283 Atoms/cm ³
84.	Zetta atomer: 28,122740 Atoms/cm ³ .	Error: 7,615740 Atoms/cm ³
85.	Zetta atomer: 26,726210 Atoms/cm ³ .	Error: 7,505210 Atoms/cm ³
86.	Zetta atomer: 18,988288 Atoms/cm ³ .	Error: 1,085712 Atoms/cm ³
87.	Zetta atomer: 0,026275 Atoms/cm ³ .	Error: 0,000725 Atoms/cm ³
88.	Zetta atomer: 4,982805 Atoms/cm ³ .	Error: 0,067195 Atoms/cm ³
89.	Zetta atomer: 14,590749 Atoms/cm ³ .	Error: 0,065251 Atoms/cm ³
90.	Zetta atomer: 26,134314 Atoms/cm ³ .	Error: 0,580686 Atoms/cm ³

91.	Zetta atomer: 30,548417 Atoms/cm ³ .	Error: 0,000583 Atoms/cm ³
92.	Zetta atomer: 38,885237 Atoms/cm ³ .	Error: 1,004763 Atoms/cm ³
93.	Zetta atomer: 48,150591 Atoms/cm ³ .	Error: 3,588409 Atoms/cm ³
94.	Zetta atomer: 50,471270 Atoms/cm ³ .	Error: 2,319270 Atoms/cm ³
95.	Zetta atomer: 49,107799 Atoms/cm ³ .	Error: 15,319799 Atoms/cm ³
96.	Zetta atomer: 33,376996 Atoms/cm ³ .	Error: 13,536996 Atoms/cm ³
97.	Zetta atomer: 32,938146 Atoms/cm ³ .	Error: 0,000854 Atoms/cm ³
98.	Zetta atomer: 35,484215 Atoms/cm ³ .	Error: 0,575785 Atoms/cm ³
99.	Zetta atomer: 36,084206 Atoms/cm ³ .	Error: 0,144794 Atoms/cm ³
100.	Zetta atomer: 31,633074 Atoms/cm ³ .	Error: 0,627926 Atoms/cm ³
101.	Unknown.	
102.	Unknown.	
103.	Unknown.	
104.	Zetta atomer: 22,703632 Atoms/cm ³ .	Error: 11,164368 Atoms/cm ³
105.	Zetta atomer: 41,602366 Atoms/cm ³ .	Error: 0,160634 Atoms/cm ³
106.	Zetta atomer: 88,292481 Atoms/cm ³ .	Error: 1,350519 Atoms/cm ³
107.	Zetta atomer: 79,837121 Atoms/cm ³ .	Error: 0,598121 Atoms/cm ³
108.	Zetta atomer: 83,450936 Atoms/cm ³ .	Error: 0,950064 Atoms/cm ³
109.	Zetta atomer: 92,127612 Atoms/cm ³ .	Error: 2,991612 Atoms/cm ³
110.	Zetta atomer: 77,774908 Atoms/cm ³ .	Error: 0,872092 Atoms/cm ³
111.	Zetta atomer: 47,511809 Atoms/cm ³ .	Error: 0,176191 Atoms/cm ³
112.	Zetta atomer: 40,742528 Atoms/cm ³ .	Error: 1,948472 Atoms/cm ³
113.	Zetta atomer: 28,696950 Atoms/cm ³ .	Error: 0,099950 Atoms/cm ³
114.	Zetta atomer: 24,692284 Atoms/cm ³ .	Error: 0,435716 Atoms/cm ³
115.	Zetta atomer: 23,715807 Atoms/cm ³ .	Error: 9,246193 Atoms/cm ³
116.	Zetta atomer: 20,225258 Atoms/cm ³ .	Error: 8,035742 Atoms/cm ³
117.	Zetta atomer: 19,025437 Atoms/cm ³ .	Error: 7,701563 Atoms/cm ³
118.	Unknown.	

Process finished with exit code 0