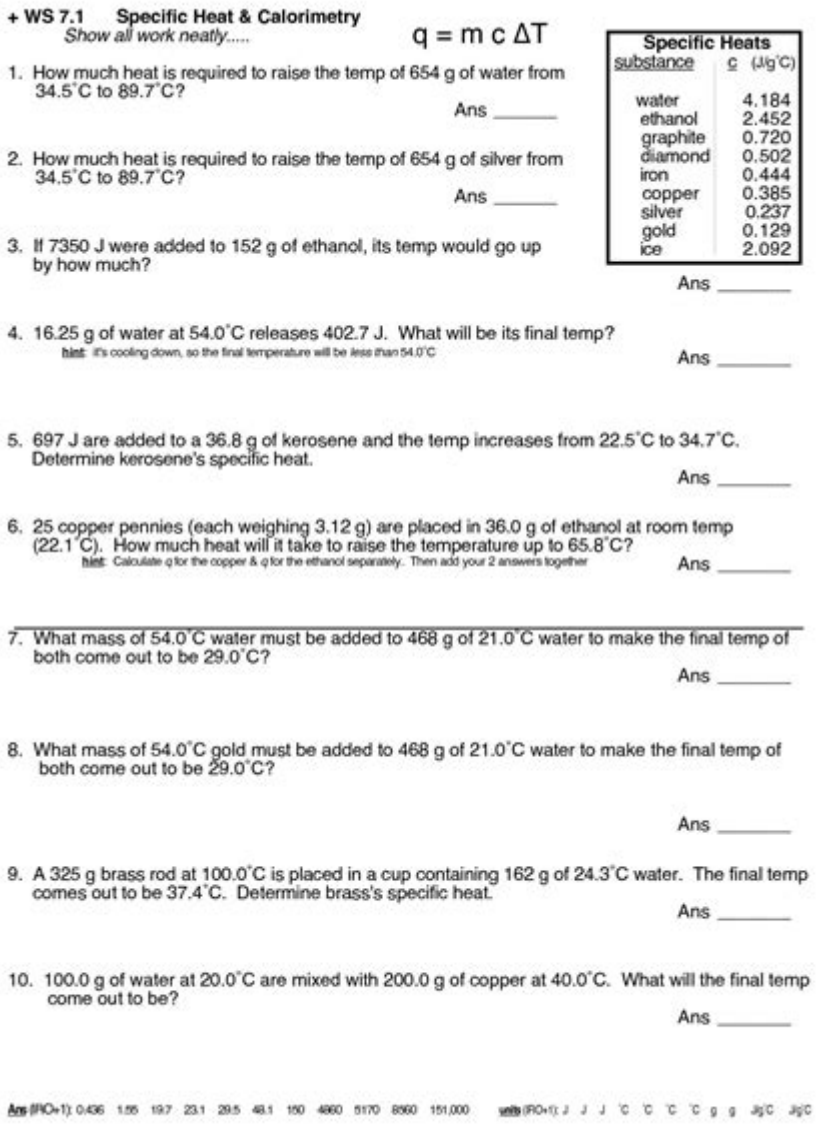
Specific Heat Calculations Worksheet Answers



+ WS 7.1 Specific Heat & Calorimetry

Show all work neatly.....

$q = m\,c\,\Delta T$

Specific Heats	
substance	c (J/g°C)
water	4.184
ethanol	2.452
graphite	0.720
diamond	0.502
iron	0.444
copper	0.385
silver	0.237
gold	0.129
ice	2.092

1. How much heat is required to raise the temp of 654 g of water from 34.5°C to 89.7°C?

   Ans _____

2. How much heat is required to raise the temp of 654 g of silver from 34.5°C to 89.7°C?

   Ans _____

3. If 7350 J were added to 152 g of ethanol, its temp would go up by how much?

   Ans _____

4. 16.25 g of water at 54.0°C releases 402.7 J. What will be its final temp?

   hint: it's cooling down, so the final temperature will be *less* than 54.0°C

   Ans _____

5. 697 J are added to a 36.8 g of kerosene and the temp increases from 22.5°C to 34.7°C. Determine kerosene's specific heat.

   Ans _____

6. 25 copper pennies (each weighing 3.12 g) are placed in 36.0 g of ethanol at room temp (22.1°C). How much heat will it take to raise the temperature up to 65.8°C?

   hint: Calculate q for the copper & q for the ethanol separately. Then add your 2 answers together

   Ans _____

7. What mass of 54.0°C water must be added to 468 g of 21.0°C water to make the final temp of both come out to be 29.0°C?

   Ans _____

8. What mass of 54.0°C gold must be added to 468 g of 21.0°C water to make the final temp of both come out to be 29.0°C?

   Ans _____

9. A 325 g brass rod at 100.0°C is placed in a cup containing 162 g of 24.3°C water. The final temp comes out to be 37.4°C. Determine brass's specific heat.

   Ans _____

10. 100.0 g of water at 20.0°C are mixed with 200.0 g of copper at 40.0°C. What will the final temp come out to be?

    Ans _____

Ans (FIO+1): 0.436 1.55 19.7 23.1 29.5 48.1 150 4860 5170 8960 151,000 units (FIO+1): J J J °C °C °C °C g g J/g°C J/g°C

Specific heat calculations worksheet answers are essential for students and professionals alike who are delving into the world of thermodynamics and physics. Understanding specific heat is crucial for various applications, from cooking to engineering. This article will explore the concept of specific heat, how to perform specific heat calculations, and provide insights into common worksheet problems and their answers.

What is Specific Heat?

Specific heat, often represented by the symbol c, is defined as the amount of heat energy required to raise the temperature of one gram of a substance by one degree Celsius (°C). It is an important physical property that varies from one material to another.

Formula for Specific Heat

The formula used to calculate specific heat is:

$$
c = \frac{Q}{m \Delta T}
$$

Where:
- c = specific heat (J/g°C)
- Q = heat energy (Joules)
- m = mass of the substance (grams)
- ΔT = change in temperature (°C)

Importance of Specific Heat Calculations

Understanding specific heat is vital in various fields, including:

- Chemistry: Helps in calculating energy changes during reactions.
- Engineering: Used in designing heat exchangers and thermal systems.
- Meteorology: Affects climate models and weather predictions.
- Cooking: Influences how ingredients heat up and cook.

Applications of Specific Heat

1. Heating and Cooling Systems: Engineers use specific heat to design systems that efficiently manage temperature changes.
2. Manufacturing Processes: Specific heat helps in processes like metal forging and glass production, where temperature control is critical.
3. Environmental Science: Understanding the specific heat of water is essential in studies related to climate change and ecosystem dynamics.

Common Specific Heat Problems

When working with specific heat, students often encounter various types of problems. Here are some common scenarios:

- Calculating the heat absorbed or released by a substance when its temperature changes.
- Determining the final temperature of a mixture when two substances at different temperatures are combined.
- Finding the mass of a substance based on its heat capacity and temperature change.

Example Problem 1: Heat Absorption

Problem: How much heat is needed to raise the temperature of 150 grams of water from 25°C to 75°C? (Specific heat of water = 4.18 J/g°C)

Solution:

1. Identify the given values:

- $m = 150 \, \text{g}$

- $c = 4.18 \, \text{J/g°C}$

- Initial temperature $T_i = 25°C$

- Final temperature $T_f = 75°C$

2. Calculate ΔT:

$$
\Delta T = T_f - T_i = 75°C - 25°C = 50°C
$$

3. Plug the values into the specific heat formula:

$$
Q = m \cdot c \cdot \Delta T = 150 \, \text{g} \cdot 4.18 \, \text{J/g°C} \cdot 50°C = 31350 \, \text{J}
$$

Answer: 31,350 Joules of heat is needed.

Example Problem 2: Mixing Substances

Problem: If 200 grams of aluminum at 100°C is mixed with 300 grams of water at 20°C, what will be the final temperature of the mixture? (Specific heat of aluminum = 0.897 J/g°C; Specific heat of water = 4.18 J/g°C)

Solution:

1. Set up the heat gained and lost:

- Heat lost by aluminum = Heat gained by water

2. Calculate the heat lost by aluminum:

$$
Q_{Al} = m_{Al} \cdot c_{Al} \cdot (T_f - T_{Al})
$$

$$
Q_{Al} = 200 \cdot 0.897 \cdot (T_f - 100)
$$

3. Calculate the heat gained by water:

$$
Q_{water} = m_{water} \cdot c_{water} \cdot (T_f - T_{water})
$$

$$
Q_{water} = 300 \cdot 4.18 \cdot (T_f - 20)
$$

4. Set the equations equal:

$$
200 \cdot 0.897 \cdot (T_f - 100) = 300 \cdot 4.18 \cdot (T_f - 20)
$$

5. Solve for T_f.

Answer: After solving, the final temperature T_f will be approximately 24°C.

Tips for Solving Specific Heat Problems

To effectively solve specific heat problems, consider the following tips:

- Always keep track of your units. Convert grams to kilograms or Celsius to Kelvin if necessary.
- Identify whether heat is being gained or lost in the scenario.
- Set up equations carefully to isolate the variable you need to solve for.
- Double-check your calculations to avoid simple errors.

Using a Specific Heat Calculations Worksheet

Worksheets dedicated to specific heat calculations are invaluable educational tools. They typically include:

- Definitions and formulas
- Sample problems with detailed solutions
- Practice problems with varying difficulty levels
- Answer keys for self-assessment

These worksheets can help reinforce concepts and enhance problem-solving skills.

Conclusion

In summary, **specific heat calculations worksheet answers** serve as a critical resource for mastering the principles of heat transfer and thermodynamics. By understanding specific heat and practicing with various problems, students can build a solid foundation in these essential scientific concepts. Whether for academic purposes or practical applications, the ability to perform specific heat calculations is a skill that will benefit individuals across many fields.

Frequently Asked Questions

What is specific heat capacity?

Specific heat capacity is the amount of heat required to raise the temperature of one gram of a substance by one degree Celsius.

How do you calculate specific heat using a worksheet?

To calculate specific heat, use the formula: specific heat (c) = heat added (q) / (mass (m) × change in temperature (□T)).

What units are used for specific heat calculations?

The units for specific heat are typically joules per gram per degree Celsius (J/g°C) or calories per gram per degree Celsius (cal/g°C).

What information do you need to solve specific heat problems?

You need the mass of the substance, the amount of heat added or removed, and the initial and final temperatures to solve specific heat problems.

Can you provide an example of a specific heat calculation?

Sure! If you add 500 J of heat to 100 g of water, raising its temperature from 20°C to 30°C, the specific heat would be c = 500 J / (100 g × 10°C) = 0.5 J/g°C.

What common mistakes should be avoided in specific heat calculations?

Common mistakes include incorrect unit conversions, not accounting for the direction of heat flow, and miscalculating the change in temperature.

Where can I find specific heat calculations worksheets?

Specific heat calculations worksheets can be found in chemistry textbooks, online educational resources, and science-related websites that offer practice problems.

Find other PDF article:
https://soc.up.edu.ph/12-quote/files?dataid=oAV90-6291&title=causes-of-world-war-1-worksheet-answer-key.pdf

Specific Heat Calculations Worksheet Answers

*special*和*specific*在同时表示"专门的，特定的"时，用法上有什么区别？ - 知乎
the difference between specific and special lies in that specific is explicit or definite while special is distinguished by a unique or …

假期快乐，*specific*和*particular*区别在哪里？ - 知乎
The words "special" and "specific" are often used interchangeably, but there are some subtle differences in meaning between …

思源黑体 (Source Han Sans) 的各个版本有什么不同？ - 知乎
关于 “language-specific OTFs” 的说明，可见原回答中的「OTC 版本」一节。因为先前的 TWHK 版本实际上是采用台湾的字形标准，所以在 1.001 …

各位大佬，有没有可以免费清理电脑C盘的软件？ - 知乎
Mar 23, 2020 · 最后再强调一下啊，清理之后，一定要将软件的默认保存位置更改为非本地磁盘啊！！！ 2□ □□□□ □□□□□□□□□□□□ □□□ …

图中三种版本的Win11有什么区别呢？ - 知乎
知乎，中文互联网高质量的问答社区和创作者聚集的原创内容平台，于 2011 年 1 月正式上线，以「让人们更好的分享知识、经验和见解，找到自己的解 …

*special*和*specific*在同时表示"专门的，特定的"时，用法上有什么区 …
the difference between specific and special lies in that specific is explicit or definite while special is distinguished by a unique or unusual quality. special: She is a special girl. (she is unique, …

假期快乐，**specific**和**particular**区别在哪里？ - 知乎
The words "special" and "specific" are often used interchangeably, but there are some subtle differences in meaning between them. Both words can be used to describe people or things …

思源黑体 **(Source Han Sans)** 的各个版本有什么不同？ - 知乎
关于 “language-specific OTFs” 的说明，可见原回答中的「OTC 版本」一节。因为先前的 TWHK 版本实际上是采用台湾的字形标准，所以在 1.001 版本中将其改名为 TW 版本。

各位大佬，有没有可以免费清理电脑**C**盘的软件？ - 知乎
Mar 23, 2020 · 最后再强调一下啊，清理之后，一定要将软件的默认保存位置更改为非本地磁盘啊！！！ 2□ □□□□ □□□□□□□□□□□□ □□□□□□□□□□□□□实安装太多，请 …

图中三种版本的*Win11*有什么区别呢？ - 知乎

知乎，中文互联网高质量的问答社区和创作者聚集的原创内容平台，于 2011 年 1 月正式上线，以「让人们更好的分享知识、经验和见解，找到自己的解答」为品牌使命。知乎凭借认真、专业 …

*concrete*和*specific*有什么区别*?* - 知乎

Dec 27, 2021 · concrete是具体的一个个东西，而specific则是那一个个东西里面的某一个。例如李白写了很多首诗，这些诗都属于concrete；其中一首是《蜀道难》，《蜀道难》就属于specific。

*SCI*论文被*reject*了，但是建议我*resubmit*，这是什么意思？ - 知乎

怎么说呢？建议你resubmit就是比直接reject好一丢丢，有一点儿客套话的感觉！如果换作是我的话，我一般会选择另投他刊了！因为我是一个只求数量不求质量的人，只要是SCI就可以，从 …

新手*SCI*投稿，导师让自己找推荐审稿人，该怎么办？ - 知乎

论文在投稿阶段，期刊一般都会有让作者推荐审稿人的环节。有些期刊要求必须填写三个推荐审稿人。推荐审稿人可以帮助编辑快速找到合适的审稿人，让你的论文更快的进入审稿流程。如 …

什么是smart原则，有什么好的例子？ - 知乎

S代表specific（具体的），思考为了实现目标，你的行动计划是否清晰？ M代表measurable（可衡量的），思考该用什么衡量是否实现了目标？也就是说，你定的目标最好是可观测的，客观 …

Materials studio2020许可证服务器启动失败**,**该怎么办**? -** 知乎

遇到了一模一样的问题，查看的小木虫，解决了：关了防火墙，然后把lilicenses里的backup 文件夹删掉。这个文件就在安装文件里面，可以用 everything软件 直接找到。然后管理员运行 …

Get precise answers for your specific heat calculations with our comprehensive worksheet. Enhance your understanding and skills today! Learn more now!

Back to Home