Study Questions for Morris (1972) "Lavoisier and the Caloric Theory"

1. What does it mean to claim that the four elements can exist in two forms, free and fixed?
2. According to Morris, what idea in the 1766 paper "...became a major and persistent feature of Lavoisier's theory of heat"?
3. What are some differences between Lavoiser's papers of 1766 and 1772?
4. According to Morris, what single purpose did Lavoisier employ his theory of heat in his early papers?
5. In his first paper of 1777, does Lavoisier make a distinction between vapors and "permanently elastic fluids"? Why is this significant?
6. According to Lavoisier, if combustion is a process of condensation in which a vapor (air) combines with a solid or liquid (the combustible), why must the heat of combustion come from the vapor and not the combustible?
7. Why did Lavoisier consider his new theory of combustion to be the reverse of the phlogiston theory?
8. How did Crawford explain temperature changes accompanying chemical transformations?
9. According to Crawford, why is there an absorbtion of heat by the blood during respiration?
10. According to Morris, what was the origin of the joint paper on heat by Lavoisier and Laplace?
11. In Lavoisier's 1785 paper on the affinities of oxygen, what are the two opposing forces that particles in substances experience? How does this signify a more physical, as opposed to chemical, approach in Lavoisier's theory of heat?
12. What are some criticisms Lavoisier mounts against the phlogiston theory in his 1785 memoir on phlogiston?
13. According to Lavoisier, why does a liquid have a higher specific heat than a solid?
14. According to Lavoisier why does a gas that solidifies during a reaction release heat? How is this related to combustion and calcination?
15. According to Morris, what is the most significant theoretical addition in the *Mémoires de Chimie* to Lavoisier's theory of heat?
16. In what contexts does caloric act mechanically? In what contexts does it act chemically?
17. According to Morris, where did Lavoisier pick up his knowledge of Joseph Black's ideas on latent heat?
18. In what sense was Lavoisier's caloric theory conservative? In what sense was it innovative?
19. What obvious phenomenon did the phlogiston theory handily explain? How did the caloric theory allow Lavoisier to offer an alternative explanation?

Study Questions for Brush (1970) "The Wave Theory of Heat"

1. What is heat according to the wave theory of heat? How is this different from the modern post-1850 conception?
2. According to Maxwell's electromagnetic theory of 1866-73, why is the nature of heat not necessarily the same as the nature of radiant heat?
3. According to Brush, what are two "myths" about the history of 19th-century physics? Who is responsible for them?
4. Why was the fact that heat can travel through empty space without any accompanying movement of matter an argument in favor of caloric theories over dynamical theories?
5. Why is Macedonio Melloni significant in Brush's history of the wave theory of heat?
6. Why was it natural to reject the caloric theory of heat as soon as one rejected the particle theory of light?
7. What was an initial problem that Ampère faced in using the same theory to explain both radiant heat and heat that conducts through material bodies?
8. What is *vis viva*?
9. According to Ampère, does it make a difference whether heat is matter or motion?
10. According to Ampère, is the role of the ether in the wave theory of heat essential?
11. According to Brush, why are William Whewell's statements about the wave theory of heat significant?
12. How could there have been 12 co-discoverers of what is today refered to as the principle of the conservation of energy?
13. What does Brush add to Kuhn's analysis of the "discovery" of energy conservation?
14. According to Brush, what is the significance of Thomson's 1849 paper "An account of Carnot's theory"?
15. According to Brush, what is the significance of Thomson's 1851 paper "On the dynamical theory of heat"?