Body of Knowledge

SDS and Label Authoring Registry

AIHA
Protecting Worker Health
About AIHA®

Founded in 1939, the American Industrial Hygiene Association® (AIHA®) is one of the largest international associations serving the needs of industrial/occupational hygiene professionals practicing in industry, government, labor, academic institutions, and independent organizations.

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Background

AIHA® and its selected members worked collaboratively to develop the technical framework, known as the Body of Knowledge (BoK), that outlines the knowledge and skills a competent person should possess and be able to demonstrate when authoring safety data sheets (SDS) and labels. In September 2015, a panel of subject matter experts was appointed to revise the SDS & Label Authoring BoK and develop a subsequent Job/Task Analysis (JTA) survey to collect input, perspective, and feedback from relevant stakeholders to identify the essential knowledge and skills required for competent SDS and label authoring. The subject matter expert project team included a subset of SDS and label authoring Registrants.

In December 2015, the JTA survey was made available to AIHA® SDS and Label Authoring Registrants. The survey results were used to finalize the content for the SDS and Label Authoring BoK.

The BoK document was approved by the subject matter expert project team June 2016.
SDS & Label Authoring

Occupational Definition

This document provides an organized summary of the collective knowledge and skills necessary for competent SDS and label authoring. This Body of Knowledge (BoK) will be used by AIHA to establish a framework to assist the prospective registrant in preparing for the exam. Prior to sitting for the SDS and Label Authoring Registry’s Competency Assessment, the applicant should ensure that they are proficient in these knowledge areas.

This BoK is not intended to define or stipulate employer hiring criteria. It is the employer’s responsibility to ensure that each employee understands his or her specific job and has met the minimum criteria established by relevant regulations, standards, and the specific industry, facility, or project.

Skills

Performance-based training incorporates performance tasks (performance assessments) that build on content knowledge. These demonstrations of knowledge and skills document competence.

Knowledge Test

The knowledge test consists of 75 multiple choice questions that evaluate your knowledge in areas in which a SDS and label authoring specialist should be proficient. These questions involve basic concepts in toxicology, ecotoxicology, industrial hygiene, chemistry, and emergency response for chemicals. You will be expected to perform mathematical calculations and conversions related to hazard classification and SDS. A formula sheet will be provided. It will contain all the formulas that you will need and all the Globally Harmonized System of Classification and Labeling of Chemicals international standard (GHS) classification tables or decision logic charts needed for substance and mixture classification questions. This BoK provides a blueprint of the type of questions you can expect in each knowledge area.

Knowledge Areas

Table 1 describes the knowledge and skills that constitute competent SDS and label authoring.
1.0 Math and Science (19%)

1.A. General mathematics & computation
1.A.1. Calculate composition percentages
1.A.2. Calculate percentages of pure substances in mixtures of mixtures
1.A.3. Convert and calculate ppm, ppb, and ppt into weight/volume percent
1.A.4. Convert ppm to mg/L, mg/mL, and g/L; and vice versa for liquids and solids
1.A.5. Convert ppm to mg/L or mg/m3 and vice versa for gases, vapors, dust and mists
1.A.6. Understand the relationship between density and specific gravity
1.A.7. Convert temperature in Celsius to Fahrenheit and vice versa
1.A.8. Understand standard unit/metric system

1.B. General Chemistry
1.B.1. Understand the differences between atoms elements and compounds
1.B.2. Demonstrate an understanding of the major types of chemical identifiers and their use (ex: CAS numbers, UN Numbers, EINECS, etc.)
1.B.3. Demonstrate an understanding of the main types of compounds (organic, inorganic, monomers, polymers, surfactants, solvents, acid, bases)
1.B.5. Understand the main chemical and physical properties included on a SDS under the GHS
1.B.6. Demonstrate an understanding of the various types of solubility (highly soluble, soluble, slightly soluble, nonsoluble)
1.B.7. Understand what pH is and how it is calculated
1.B.8. Understand and identify reaction products
1.B.9. Understand the differences between stability and reactivity
1.B.10. Differentiate between the three physical forms (gas, liquid, solid) and understand the hazard potentials for each
1.B.11. Understand the route of exposure potential for the different physical forms
1.B.12. Understand the meaning of physical property with regard to the hazard of the property

1.B.13. Understand the meaning of physical properties and their test methods to determine the end point (e.g. vapor pressure, boiling point, flash point)

1.B.14. Understand the behaviors of mixtures vs substances

1.B.15. Understand how temperature and pressure impact other hazards outside the scope of the specifically defined hazard classes

2.0 Hazard Communication (20%)

2.A. GHS Concepts

2.A.1. Understand the scope of the GHS

2.A.2. Understand the structure of the purple book

2.A.3. Demonstrate an understanding of the scope, application and limitations of the GHS

2.A.4. Apply knowledge of GHS concepts including the building block approach and application

2.A.5. Understand GHS definitions like hazard class, hazard category, weight of evidence, etc.

2.A.6. Demonstrate an understanding of which elements of the GHS are applicable to the different sectors (transport, workplace, consumer products)

2.A.7. Apply knowledge of GHS Classification Principles for substances and mixtures

2.A.8. Demonstrate an understanding of using cut-off values

2.A.9. Understand labeling concepts

2.A.10. Demonstrate an understanding of the general guidelines for SDS reader comprehension

2.A.11. Demonstrate an understanding of the relationship between each section and piece of data on the SDS document so that consistency can be achieved throughout the document

2.A.12. Identify data sources on the SDS (mixture testing versus component data)

2.A.13. Understand the term article

2.A.14. Demonstrate an understanding of the building block approach

2.A.15. Understand and identify the harmonized GHS label elements
2.B. SDS Content & Label

2.B.1. Demonstrate an understanding of identifying chemicals (IUPAC, common names, CAS, EC)

2.B.2. Understand the concepts found on a safety data sheet and the audience(s) for each section

- Identification (Product Name/Manufacturer Information including Emergency Contact Information/Recommended Use/Restricted Use)
- Hazard Identification
- Composition
- First-aid measures
- Fire-fighting measures
- Accidental release measures
- Handling and storage
- Exposure Controls and Personal Protective Equipment
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological information
- Disposal considerations
- Transport information
- Regulatory Information
- GHS labeling requirements
- NFPA or HMIS ratings (Alternative labeling systems)
- Other information

2.B.3. Know the process in which an SDS is developed (Order of section development)

2.B.4. Know how to review an SDS for internal consistency

2.B.5. Understand the sections, required format, and the content of a GHS Safety data sheet

2.B.6. Demonstrate knowledge for the selection of label elements (pictogram(s), signal word, hazard statement(s) and precautionary statement(s) based on a GHS Classification
2.B.7. Know the elements of a GHS compliant label
2.B.8. Understand how a GHS label is developed using the tables in Annex 3 of the GHS
2.B.9. Know the order of precedence for the label elements in the GHS

3.0 Physical Hazards (9%)

3.1. Apply knowledge of the 17 physical hazard classes and when to use them
3.2. Understand the use of ISO 10156:2010 in calculating the flammability of gas mixtures under GHS
3.3. Understand how the hazard classes under the GHS physical hazards section relate to and can be used to determine the transportation information - hazard class, packing group, etc. (**Note: Formal training on transportation regulations is required before an SDS author can apply this to section 14 of an SDS.)
3.4. Familiarize yourself with the test methods used to determine physical hazards and how to interpret test data for the various classes
3.5. Demonstrate an understanding of Hazards Not Otherwise Classified (HNOC) and where they are implemented
3.6. Demonstrate an understanding of combustible dust

4.0 Health Hazards (21%)

4.A. General Concepts
4.A.1. Understand data conversion (1 hour to 4 hour for inhalation toxicity data, ppm to mg/L for vapor toxicity)
4.A.2. Distinguish between the different forms of matter (gas, vapor, mist, dust)
4.A.3. Understand the relevant ingredients concept for untested mixture classification in the hazard classes that use additivity (Acute Toxicity, Skin Corrosion/Irritation, Serious Eye Damage/Eye Irritation, Target Organ Toxicity – Single Exposure Category 3, Aspiration Hazard, and Hazardous to the Aquatic Environment)

4.A.4. Convert range data or acute toxicity category to a point estimate for mixture calculations

4.A.5. Understand how to properly handle ingredients with unknown acute toxicity

4.A.6. Apply knowledge of the 10 health hazard classifications and when to use them for substances

4.A.7. Understand the GHS tiered approach to classifying mixtures (e.g. tested mixtures, bridging principles, untested mixture calculations)

4.A.8. Demonstrate an understanding of HNOCs and where they are implemented

4.B. General Toxicology Concepts

4.B.1. Understand the term toxicology

4.B.2. Understand how chemicals move into and out of the body: absorption, distribution, metabolism and excretion


4.B.4. Understand the threshold response concepts (NOEL, NOAEL, LOAEL)

4.B.5. Understand the adverse health effect concept

4.B.6. Distinguish between immediate (acute) vs. Delayed (chronic) effects

4.B.7. Distinguish between Local vs. Systemic effects

4.B.8. Distinguish between Reversible vs. Irreversible effects

4.B.9. Understand toxicity tests

4.B.10. Understand preferred species for acute toxicity tests

4.B.11. Understand when Additivity is used and when it is not (skin corrosion/irritation, serious eye damage/eye irritation)

4.B.12. Understand weight of evidence

4.C. General Biology

4.C.1. Demonstrate an understanding of the structure and function of target organs (e.g. respiratory system, kidney, liver, nervous system)
5.0 Environmental Hazards (8%)

5.A General Ecotoxicology Concepts

5.A.1. Understand the toxicity endpoints: LD50, LC50, EC50, NOEC

5.A.2. Understand and identify the different methods and durations for acute aquatic toxicity testing and the organisms used

5.A.3. Understand and identify the different methods of classification for chronic aquatic toxicity testing and the organisms used

5.A.4. Demonstrate an understanding of persistence testing (i.e., biodegradation, hydrolysis, photolysis)

5.A.5. Demonstrate an understanding of bioconcentration and bioaccumulation (logKow/Pow)

5.A.6. Demonstrate an understanding of degradation

5.A.7. Understand the concept of M factor

5.A.8. Understand how to apply the criteria for Ozone Depleting Potential under the GHS

5.A.9. Apply criteria for classifying substances for acute and chronic aquatic toxicity potential including the concept of different trophic levels (fish, aquatic inverts, aquatic plants)

5.A.10. Understand the GHS tiered approach to classifying mixtures (e.g. tested mixtures, bridging principles, untested mixture calculations) (i.e. Summation and Additivity)

5.A.11. Understand how to properly handle ingredients with unknown hazards to the aquatic environment

6.0 Industrial Hygiene & Safety (12%)

6.1. Determine which exposure limit to include in the SDS based on the exposure limits given

6.2. Understand the types of threshold limit values (i.e., TWA, STEL, Ceiling Limit, IFV, Excursions, BEI, Respirable Fibers, Dust Limits – total, inhalable, thoracic fraction and respirable)

6.3. Understand significant routes of exposure for various physical states

6.4. Understand the applicability of engineering controls (i.e., ventilation)
6.5. Demonstrate an understanding of the PPE recommendations related to hazards, quantity, and conditions of use

6.6. Understand and apply appropriate first-aid measures based on classification

6.7. Demonstrate an understanding of special treatments for exposure

6.8. Consider special needs that a physician should be made aware of when completing the first-aid section (section 4) of the SDS

6.9. Differentiate between suitable/unsuitable controls for fire types

6.10. Understand and identify the specific hazards arising from burning chemical fires

6.11. Demonstrate an understanding of compatible and incompatible chemical placement

6.12. Select precautionary statements for safe handling based on classification and physical properties

6.13. Recommend personal precautions, protective equipment and protective measures for spilled product(s)

6.14. Understand how stability and reactivity relate to an SDS

6.15. Identify the drivers behind chemical incompatibility

6.16. Apply knowledge of chemical incompatibility

7.0  Risk Analysis (2%)

7.1. Understand the relationship between risk, hazard, and exposure

7.2. Understand how consumer product labeling can be based on the likelihood of injury (see GHS Annex 5)

7.3. Understand how the term “biologically available” can be considered when performing hazard classification
8.0  International GHS Implementation, Associated Regulations & Consensus Standards (8%)

8.1. Understand the US OSHA specific hazard classes

8.2. Demonstrate an understanding of environmental regulations that would impact Section 15 of the SDS sheet (i.e., CERCLA, SARA, TSCA, etc.)

8.3. Understand SDS content required by EPCRA (SARA 313)

8.4. Demonstrate an understanding of dangerous goods transportation

8.5. Identify and list OEL/BEI for different areas/countries (i.e. PEL, TLV, MAK, REL)

8.6. Demonstrate understanding of Right to Know Laws

8.7. Apply general understanding of disposal regulations

8.8. Demonstrate an understanding of Inventory and chemical control laws (US TSCA, Canadian DSL, NDSL, etc.)

8.9. Demonstrate basic knowledge of EU CLP Annex VI

8.10. Understand the characteristics of a study that adds to its weight of evidence for classification (e.g., Good Laboratory Practice (GLP), statistical significance, etc.)

8.11. Know requirements for OSHA’s Hazard Communication Standard 2012

8.12. Understand which ingredients or impurities must be disclosed in an OSHA HCS 2012 SDS

8.13. Understand what information may be claimed as trade secret under OSHA HCS 2012

8.14. Be familiar with the comprehensibility concepts for SDSs and labels (e.g., ANSI Z1291/Z4001)