

Advanced Chemical Tanker Workbook

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1. Information

Please read the following notes carefully before carrying out the assignments.

The assignments have been written on the assumption that you have experience on this type of tanker and/or working on this type of tanker with the appropriate Safety Management System (SMS) in place.

You may find that some questions do not apply directly to the ship type or size that you are familiar with, however you must attempt to answer these. Use the learning from all course modules, recommended industry publications, the Company SMS and advice from fellow officers onboard to present your answers. All questions must be attempted as incomplete portfolios will be returned unassessed.

Health, Safety and Protocol

Much of the work will require you to research information from your current or most recent ship. Always comply in full with all Health and Safety protocols and seek permission from the Master and/or relevant officers where your work takes you away from your ordinary routine. Take care not to interfere with shipboard operations and time your work to fit in with the work of others.

2. Assessment Guidelines

Learning Outcomes of the Course

On successful completion of the course you will:

1. understand the chemical and physical properties of cargoes and the hazards and control measures associated with carrying chemicals on board tankers
2. know what is involved in the safe operation and monitoring of cargo on board a chemical tanker
3. be able to apply health, safety and environmental precautions in working on a chemical tanker
4. be able to perform and monitor safe chemical tanker cargo operations in compliance with legislative requirements

There are ten modules in this course mapped to the learning objectives, as follows:

MODULE	LEARNING OUTCOMES ADDRESSED
Module 1 INTRODUCTION	1
Module 2 PHYSICS AND CHEMISTRY	1
Module 3 HAZARDS	1 & 3
Module 4 LEGISLATION	4
Module 5 SHIP DESIGN, CARGO CONTAINMENT AND BALLAST SYSTEMS	2 & 3
Module 6 CARGO HANDLING SYSTEMS	2 & 4
Module 7 CARGO HANDLING AND BALLAST OPERATIONS	2 & 3
Module 8 TANK CLEANING OPERATIONS	2 & 3
Module 9 SAFETY AND POLLUTION PREVENTION	2, 3 & 4
Module 10 EMERGENCY PROCEDURES	3

Assessment

For this course, you are assessed in two ways:

Assessment	Delivery	Learning Outcomes Assessed	Minimum Pass mark
1. Final Test	Closed questions - onscreen	1-4	75%
2. Module Assignments	Open questions – completed offline	1-4	Grade A

- You must achieve at least 75% in the final test and Grade A or higher in all module assignments. If you do not achieve this result in any one element, you will be required to review the course material and re-attempt that element. Note that a re-assessment fee may be payable.
- All onscreen tests are automatically marked and the result displayed onscreen. You will be required to print the final test result immediately after you complete these tests. The course documentation checklist refers.
- Criteria marking is used to mark all module assignments. The marking scheme used is provided in **Annex A**.
- A grading sheet will be completed by the course assessor when your module assignments are marked. This will be sent to you. Where necessary the course assessor will provide feedback or notes for your attention.

Completing Module Assignments

The following word count is suggested for each of the module assignments of the course.

Module	Question(s)	Suggested Word Count
1	1	80-100
2	1	50-60
3	1	50-60
	2	50-60
	3	50-60
	4	List 8
	5	10-15
4	1	80-100
	2	List 10
	3	15-20
5	1	List 13
	2	80-100
	3	50-60
	4	2 sketches
6	1	80-100
	2	50-60 + 2 sketches
	3	20-30
	4	80-100
	5	60-80
	6	60-80 + sketch

	7	30-40
7	1	100-150
	2	50-60
	3	80-100
	4	List 15
	5	Attachment
8	1	80-100
	2	100-120
	3	50-60
	4	100-120
9	1	80-100
	2	List 7 + 7
	3	130-150
	4	20-30
	5	230-250
10	1	60-80

Module assignments should be completed electronically (font size 12) or by hand in clear handwriting. Where required or as appropriate, you may provide diagrams or sketches to illustrate your answers. SMS procedures and documents are accepted as scans/attachments. The course assessor reserves the right to reject work that is not presented clearly and legibly.

You are reminded that the final test and module assignments **must** be completed under 'exam conditions'. This means under the direct supervision of an authenticating person who will attest that your assessments have been completed unaided and solely by you. You are strongly advised to keep a back-up of all your work before sending it to us for Assessment. Anything you quote or paraphrase from a publication or other source must be referenced in your work, by giving the following information:

- Author's name
- Title of Publication
- Year (and day/month if a newspaper article or magazine) published
- Page reference
- Name of Publisher
- Place of Publication

Method of acknowledging other's work

- a) Use "quotation marks" round the actual words you have copied and insert a brief reference in brackets () at the end. The brief reference should contain author's name and publication year only.
- b) Supply the full reference in a list at the end of your answer.
 - i. Example
"Crude Oil is any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes:..." (SOLAS 1997 p148)

and then, at the end of the answer, supply the full reference thus:

SOLAS, Consolidated Edition 1997, Ch II-2 Para 28, International Maritime Organization, London.

ANNEX A - GRADE CRITERIA FOR MODULE ASSIGNMENTS

Notes

- Percentage marks shown under each grade are for guidance only. The assessor will only issue a grade for each module assignment.
- All module assignments must achieve a pass grade for a course certificate to be issued.

MARKING CRITERIA:	GRADE CRITERIA				
	Grade D Refer (0-24%)	Grade C Refer (25-49%)	Grade B Refer (50-74%)	Grade A Pass (75-85%)	Grade A+ Pass (86-100%)
Submitted answer fully addresses the assignment question	Poor, significant missing or inaccurate information	Unsatisfactory, mostly inaccurate or missing information	Satisfactory, planning and structure but key elements missing or inaccurate	Good, any errors or omissions are within acceptable limits	Excellent, all key criteria included with no factual errors
Comprehensive knowledge of relevant taught material has been demonstrated	Poor, core modules information missing or superficial coverage	Unsatisfactory, superficial, inaccurate or weak description of taught content	Mainly satisfactory, but some elements of relevant content missing	Good description of relevant content appropriate to question. Some use of additional information sources used	Excellent description of relevant content appropriate to question. Additional information sources used to good effect
Knowledge of industry best practice, Codes and/or Regulations has been demonstrated where applicable	Token attempt. Poor, missing or inaccurate information	Incorrect or limited application of Codes or regulations used. Little use of best practice applied to question	Answer is satisfactory with some limited use of Codes, regulations or best practice in answering the question	Good knowledge of relevant industry best practice, Codes and/or Regulations demonstrated	Thorough knowledge of relevant industry best practice, Codes and/or Regulations fully demonstrated
Work shows evidence of further reading beyond the taught content	Poor, little or none is evident	Some evidence shown	Satisfactory in some respects, but limited in scope	Good use of further reading shown in answer	Excellent, consistent evidence of further reading has been used
Word count for each question has been complied with	Little attempt made to meet word count limits	Word count limits not met for majority of modules	Word count limits have been met for majority of modules	Word count limits met	Word count limits met

3. Advanced Chemical Tanker Assignments

Module 1

1. List the four basic Chemical groups and give a brief description of each.

Module 2

1. Select three bulk chemical cargoes:
 - a) Identify the basic chemical group of each.
 - b) Indicate whether any of these are self-reacting and if so what precautions are required.
 - c) Indicate whether any of the cargoes require heating and if so what the required carriage temperatures are.

Module 3

1. List three cargoes that are commonly carried by a chemical tanker that pose serious toxicity hazards.
 - a) Provide the TLV for these cargoes.
 - b) List the symptoms that would be associated with exposure to them.
2. Using one of the cargoes identified in question 1, create brief bullet points that you would use to advise crewmembers of the hazards involved and special precautions to be taken.
3. Describe the reference information (e.g. codes, publications, guides and manuals), available to ships' officers that enable the safe carriage of bulk chemical cargoes.
4. State all cargo specific documentation (e.g. certificates, manuals and checklists) that must be on board before the cargo is accepted for transportation.
5. State where you would find out how many portable gas-detecting devices there should be carried on board.
 - a) State where you would expect the instruments to be stowed.
 - b) State which of these would be suitable for checking the level of flammable gas inside a tank.

Module 4

1. Give a brief outline of the information contained in a vessel's Procedures & Arrangements (P&A) Manual.
2. List all the Statutory Certificates for which a specific 'chemical tanker' survey, inspection or examination are required.
3. What is the period of validity of the Certificate of fitness?
 - a) Outline the surveys required for it to remain valid.

Module 5

1. List the criteria in the different columns of Chapter 17 of the IBC code.
2. Describe the cargo pump room ventilation arrangements for a chemical tanker.
 - a) State what additional safety features are incorporated to minimise any hazards to personnel or the ship.

3. Compare the terms 'independent', 'integral' and 'gravity' when referring to cargo tanks.
4. Provide simple cross sectional sketches to illustrate the minimum tank location requirements for cargo tanks on Type 1 and 2 chemical tankers.

Module 6

1. Fully describe the annual test procedure for cargo hoses carried on board a chemical tanker.
2. With the aid of diagrams, explain the operating system of two different types of valves fitted to a chemical tanker, identifying advantages and disadvantages.
3. List three different coating types used in chemical tanks.
 - a. For each coating list three cargoes that require that type of coating.
 - b. State where you would find detailed information on coating compatibility and any limitations.
4. Describe the method used for venting cargo tanks during loading.
 - a. Explain the hazards involved in venting and the measures that are taken to minimise them.
5. Give two examples of the different types of cargo pump commonly used on board chemical tankers.
 - a. Explain the principal difference in their design.
6. Explain how discharge rates are influenced by distance and height of the receiving tanks.
 - a. Reference your answer to the pump performance curve.
 - b. List any other significant factors to be taken into consideration.
7. List the different methods of supplying and producing inert gas on board a chemical tanker.
 - a. What is the chemical composition of flue gas?
 - b. Explain why nitrogen is often the stipulated requirement for chemical cargoes.

Module 7

1. In the initial planning stages, identify the main factors to be considered in order to establish if the ship and equipment can safely carry the proposed cargo.
 - a) Briefly describe how the Cargo Compatibility chart should be used.
2. Create a bullet point list of the checks you would carry out in the initial stages of a loading operation.
 - a) Briefly describe the emergency shut down procedure.
3. Explain the need for a chemical tanker to take cargo samples during a loading operation.
 - a) What are the safety procedures to be followed?
 - b) What are the general requirements for labelling and stowage of samples?
4. Identify 5 Category X cargoes, 5 Category Y cargoes and 5 Category Z cargoes.
5. Acting as Chief Officer, complete a ship/shore safety checklist prior to commencement of a loading operation for a toxic and flammable chemical cargo. (A copy is available in ISGOTT or use the copy from the Company SMS).

Module 8

1. In relation to tank cleaning operations, explain the terms:
 - a) Undefined
 - b) too rich
 - c) too lean
 - d) inerted
2. List the safety procedures and precautions to be considered during tank cleaning

- operations when in port.
3. Briefly describe two types of equipment that may be used for gas freeing.
 - a) What are the procedures and precautions to be followed when using each type?
 4. Briefly describe the cleaning procedure and MARPOL discharge criteria for any two different category chemical cargoes.

Module 9

1. Briefly, describe the procedure for testing portable gas detection equipment
 - a) What is the frequency of such tests?
 - b) What is the frequency for testing the instruments ashore?
2. List the personal protective equipment (PPE) that would be available on board ship for routine duties.
 - a) List the additional PPE as required by the IBC Code.
3. Using an emergency drill that you have taken part in as an example, provide the following information:
 - a) type of drill and location on ship
 - b) numbers and ranks of personnel involved
 - c) nature of briefing given to participants before the drill
 - d) describe the actions taken during the drill by the main participants
 - e) nature of de-briefing after the drill
4. State any changes you would suggest to make drills more effective.
 - a) Describe how you might bring your ideas to the attention of Senior Officers and managers ashore.
5. Define the term 'enclosed space'.
 - a) Explain the safety procedures to be followed prior to, and during, an entry into an enclosed space.

Module 10

1. List the information that is contained on a Fire Plan.
 - a) Additional to the Fire Plan at the top of the gangway, what other information is available on board and would be required by shore rescue agencies in responding to emergency situations on board?

If you need assistance or clarification on the contents of this workbook, do not hesitate to contact us at courses@oceantg.com

4. Document status

Issue no.	Date	Author
V1	17 Nov 2020	IG
V2	9 June 2021	SG

5. Changes in the document

Issue no.	Paragraph no.	Description
V2	1	Minor amends to wording
	2	New Assessment Guidelines with Annex A inserted incorporating some existing information on referencing. Subsequent paragraphs renumbered.