Water Process Technician

Sample Practice Knowledge Assessment

Note: this sample test has 40 questions and duration of 70 minutes; the live test has 50 questions and duration of 90 minutes

Please write clearly in block capitals below	
Employer Name	
First Name (s)	
Last Name (s)	
Date of Birth	
Candidate Number	
Apprentice signature	
Date of Knowledge Test	

Level: 3

Standard: Water Process

Pathway: Waste Water Treatment Technician

Duration: 70 minutes

Materials

For this paper you must have:

- Pens
- Scientific calculator (non-programmable)

Instructions

- Use black ink or black ball-point pen
- Fill in the boxes at the top of this page
- Answer **all** questions

- There are questions, possible answers as well as a column for you to mark your answer
- Mark your answer with an ☒ against the possible answer you think is correct- if you wish to change your answer please put a line through ~~☒~~ and re-select with another ☒
- Only one answer per question allowed. Answers which do not follow the rules of selection will be disallowed. This may impact on the grade awarded
- Do all rough work in this answer book

Below is a Sample:

Example Question		
London is the capital of…		
Possible answers		**Answer**
a)	Wales	~~**X**~~
b)	Scotland	
c)	Northern Ireland	
d)	England	**X**

Information

- There are **40** sample questions
- There will be 50 questions in the live knowledge assessment
- All questions should be attempted

Advice

- You are not permitted to leave the examination room for the first 45 minutes and the last 15 minutes of the examination
- Do not spend too long on one question
- Read all questions thoroughly before starting your examination
- Cheating: you will be asked to leave the examination room and will be classified an automatic fail and referred to your employer

Do not turn over the page or commence the knowledge test until the invigilator instructs you to

You may use this page for rough work.

This page must not be removed.

Question 1		
RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences) requires the reporting of dangerous occurrences at work. Which ONE of the following is not reportable as a dangerous occurrence?		
Possible answers		**Answer**
a)	The collapse or overturning of a crane	
b)	Contact with an overhead power line	
c)	Escape of a biological agent likely to cause severe illness	
d)	Accidental damage to a drain or sewer	

Question 2		
An employee has to carry out a work activity which involves a substance that can be hazardous to health. What should they do?		
Possible answers		**Answer**
a)	Carry on with the work once they have identified the hazardous contents of the container	
b)	Carry out the work, providing they have been suitably trained and have the necessary COSHH assessment information	
c)	Carry out the work using their own initiative to change working procedures and reduce exposure	
d)	Carry out the work once the workplace has been sealed to allow disinfection	

[Please turn over for question 3]

Question 3		
Which ONE of the following is the most common cause of workplace injury?		
Possible answers		**Answer**
a)	Falling from height	
b)	Attacks by animals	
c)	Manual handling injuries	
d)	Electric shocks	

Question 4		
Which ONE of the following weather conditions is classed, by the EA (Environment Agency), as unusual weather under the unusual weather condition in a permit?		
Possible answers		**Answer**
a)	Significant snow deposits	
b)	A period of 2 months with no rainfall	
c)	Temperatures above 34 degrees Celsius	
d)	High winds exceeding 70 mph	

Question 5		
Final effluent quality standards are usually based on numeric values for sanitary deteminands. Which **ONE** of the following is **NOT** a sanitary determinand?		
Possible answers		**Answer**
a)	Ammonia	
b)	Iron	
c)	BOD	
d)	Suspended solids	

Question 6		
How can you tell if the rotating brush on an escalator type inlet screen needs adjusting?		
Possible answers		**Answer**
a)	By looking at the front face of the inlet screen, and checking if the elements are clean	
b)	By looking at the rotation of the brush drive gearbox, when the inlet screen is operating	
c)	By looking on the control panel of the inlet screen, and checking the lights are on	
d)	By looking at the rear of the screen, and checking if the elements are partially blinded	

Question 7		
What are the 4 stages of the process, as designed in a Primary Settlement Tank (PST)?		
Possible answers		**Answer**
a)	Inlet, outlet, settlement, sludge	
b)	Inlet, bottom, top, outlet	
c)	Inlet, hopper, bellmouth, flume	
d)	Crude, settlement, distribution, final	

[Please turn over for question 8]

Question 8		
Following on-site experience, and an engineering report, it has shown a site has carry over of solids from its Primary Settlement Tanks (PST's). This is a result of hydraulic problems specifically relating to the size of the tank, and therefore the hydraulic retention time and upflow velocity. What would be the best way to be informed of an issue with this asset before it affects the final effluent quality?		
Possible answers		**Answer**
a)	PST sludge blanket detector	
b)	Final effluent iron monitor	
c)	Inlet flowmeter	
d)	Final effluent turbidity monitor	

Question 9		
A circular primary tank needs emptying. The tank dimensions are 4m radius and 5m deep. The tank floor is flat. A temporary pump has been brought in to empty the tank. The pump will empty the tank at 100 l/sec. How long will it take to empty the tank (to the nearest minute)?		
Possible answers		**Answer**
a)	15 minutes	
b)	42 minutes	
c)	64 minutes	
d)	90 minutes	

[Please turn over for question 10]

Question 10		
A centrifugal pump has worn internal parts caused by grit, sand and silt in the flow. Which one of the following is a likely early indicator?		
Possible answers		**Answer**
a)	Increasing noise levels	
b)	A drop in the closed valve head	
c)	Increasing vibration levels	
d)	A drop in the flow capacity of the pump	

Question 11		
Weeds are growing on the top of a percolating filter. Which one of the following statements about the weeds is correct?		
Possible answers		**Answer**
a)	The weeds should be removed as required to prevent disruption of the filter arms	
b)	The weeds show that the effluent is good quality and full of nutrients	
c)	The weeds assist with the removal of ammonia from the effluent	
d)	The weeds provide shelter for the grazers which are present in the film	

Question 12		
What is a normal pH operating range in a well performing primary anaerobic digester?		
Possible answers		**Answer**
a)	3.5 - 4.5	
b)	5.5 - 6.5	
c)	6.5 - 7.5	
d)	7.5 - 8.5	

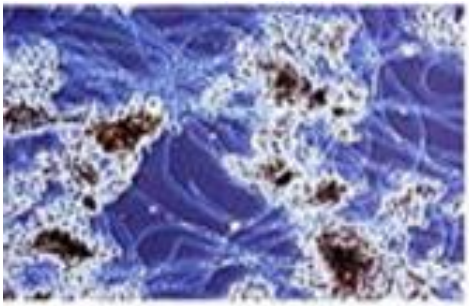
Question 13		
Why is it necessary to treat sewage effluent with Ultraviolet (UV) light?		
Possible answers		**Answer**
a)	To significantly reduce the numbers of viable bacteria contained in the effluent	
b)	To polish the effluent and make it aesthetically more pleasing to people on the beach	
c)	To reduce the concentrations of total suspended solids in the effluent	
d)	To improve compliance with the EA consent standards for sanitary determinands	

Question 14		
A modest increase in F:M ratio of an Activated Sludge process (ASP) is achieved by which **one** of the following options?		
Possible answers		**Answer**
a)	Increasing the MLSS (Mixed Liquor Suspended Solids)	
b)	Decreasing the MLSS	
c)	Increasing the DO (Dissolved Oxygen)	
d)	Building extra aeration tanks	

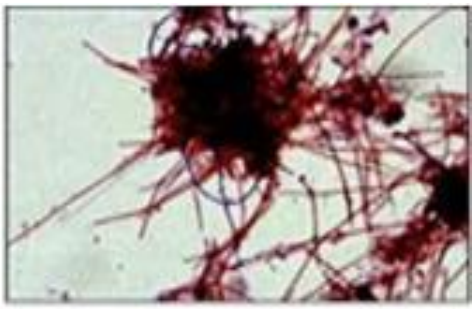
[Please turn over for question 15]

Question 15

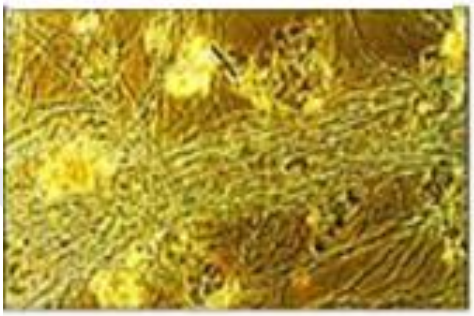
Study the photographs below of activated sludge from different plants. From the evidence in the photographs, which activated sludge will be the best settling?



Activated Sludge 1



Activated Sludge 2



Activated Sludge 3

Activated Sludge 4

Possible answers		Answer
a)	Activated sludge 1	
b)	Activated sludge 2	
c)	Activated sludge 3	
d)	Activated sludge 4	

[Please turn over for question 16]

Question 16		
A BAFF has an average feed rate of 150Ml/d with an ammonia concentration of 15mg/l. If the volume of media is 9000m^3, what is the ammonia load per m^3 of media for the day (kg/m^3/d)?		
Possible answers		**Answer**
a)	0.15	
b)	0.2	
c)	0.25	
d)	0.3	

Question 17		
Which of the following pairs or organisms are responsible for the removal of ammonia from sewage?		
Possible answers		**Answer**
a)	Nitrosomonas and Nitrobacter	
b)	Flagelates and ciliates	
c)	Carchesium and Vorticella	
d)	Epistylis and Aspidisca	

Question 18		
Why is the wash water system on a Gravity Belt Thickener (GBT) necessary?		
Possible answers		**Answer**
a)	It cools the machine down	
b)	It thins the sludge down to less than 5% dry solids before adding to the belt	
c)	It cleans the belt to prevent blockages	
d)	It washes the sludge to increase the throughput	

Question 19		
A pollution incident occurs and has a significant effect on water quality, damage to aquatic ecosystem, reduction in amenity, short term persistence and impact on people. What EA (Environment Agency) pollution category is it?		
Possible answers		**Answer**
a)	One	
b)	Two	
c)	Three	
d)	Four	

Question 20		
According to DEFRA's 'Code of Practice on Odour Nuisance from Sewage Treatment Works (April 2006)', every wastewater plant with an odour problem should have what?		
Possible answers		**Answer**
a)	Covers and odour control equipment	
b)	An Odour Management Plan	
c)	A wet chemical scrubber	
d)	Odour monitoring equipment at the site boundary	

[Please turn over for question 21]

Question 21			
What does this blue sign indicate?			
Possible answers		**Answer**	
a)	A warning		
b)	Prohibited behaviour		
c)	Information		
d)	Mandatory behaviour		

Question 22		
Which ONE of the following tests would **NOT** be used to monitor the performance of a primary anaerobic digester?		
Possible answers		**Answer**
a)	pH	
b)	Volatile Fatty Acids (VFA's)	
c)	Biochemical Oxygen Demand (BOD)	
d)	Alkalinity	

Question 23		
Screens maintenance and optimisation are important for a number of reasons. Which ONE of the following is the most costly consequence of decreased screenings capture?		
Possible answers		**Answer**
a)	Longer screen running times	
b)	Final effluent sampler blockages	
c)	Increased screening skips	
d)	Primary sludge pump blockages	

Question 24		
Why do water companies measure the residual Dissolved Oxygen (DO) on the outlet stream of the Biological Aerated Flooded Filter (BAFF)?		
Possible answers		**Answer**
a)	To get an indication of when a cell needs washing	
b)	To get an indication of when pH correction is needed	
c)	To ensure the efficiency of the ammonia removal process	
d)	To ensure the blowers are delivering adequate process air for nitrification	

Question 25		
What does the effective removal of clean grit from the flow of sewage at the inlet of a wastewater works depend on?		
Possible answers		**Answer**
a)	Reducing the flow rate to approximately 3 l/minute	
b)	Maintaining a volume of approximately 3m3 in the grit sump	
c)	Reducing the flow velocity to approximately 0.3 m/sec	
d)	Increasing the scraper rotation speed to approximately 0.3 m/sec	

Question 26		
Poor screenings removal at the inlet of a sewage works causes a number of problems. Which ONE of the following issues is not a potential consent compliance issue?		
Possible answers		**Answer**
a)	Failure to take an UWWTD sample due to blocked sample tubes	
b)	Gross solids passed on to the digestion plant	
c)	Blocked sparge holes on a filter distributor stopping rotation	
d)	Gross solids passing out in the settled storm discharge	

Question 27		
After starting work in a new area, a technician notices that the stilling box on the Primary Settlement Tank (PST) has excessive movement. There are ripples on the surface of the PST in high flows, and solids loss occurs regularly from the PST. What is the most likely cause of this?		
Possible answers		**Answer**
a)	The PST has a hydraulic restriction with too much flow going to it	
b)	The wind is causing this problem	
c)	The Auto-Desludge pump is blocked, and every time it pumps it is causing this problem	
d)	The incoming pumped flow is fluctuating as it pumps the wet well down regularly	

[Please turn over for question 28]

Question 28		
Under normal dry weather conditions, how should an escalator type inlet screen operate?		
Possible answers		**Answer**
a)	The inlet screen should rotate all the time removing the gross solids, with the spray bar washing the elements. The screenings handing system will compact the captured gross solids	
b)	The inlet screen should operate in auto with the elements stationary, awaiting for the screens differential or inlet level to reach a predetermined set point. The screen should rotate for 300 seconds or 5 minutes and then initiate a wash cycle, triggering the screenings handling system	
c)	The inlet screen should operate in auto with the elements stationary, awaiting the screens differential or inlet level to reach a predetermined set point, and then operate so only the blinded elements are lifted out of the flow before stopping again. This should repeat 3-5 times and then initiate a wash cycle, triggering the screens washing and handling system	
d)	The inlet screen should operate in auto with the elements stationary, awaiting for the screens differential or inlet level to reach a predetermined set point and operate so only the blinded elements are lifted out of the flow, the screens wash water system and screens handling system should operate every step cycle	

Question 29		
What is the purpose of a bottom fixed brush and lead-in rubber on an escalator / step type inlet screen?		
Possible answers		**Answer**
a)	To remove gross solids from the elements	
b)	To create a flexible seal on the bottom of the inlet screen, directing the solids onto the elements	
c)	To keep the chains tensioned, ensuring the bottom sprockets are aligned	
d)	To allow the gross solids to pass under the inlet screen, and into the treatment process	

Question 30		
In the nitrification process, which simple chemical equation is true?		
Possible answers		**Answer**
a)	Ammonia + oxygen converts to nitrite + oxygen converts to nitrate	
b)	Ammonia + oxygen converts to hydrogen peroxide converts to water	
c)	Ammonia + oxygen converts to ammonia gas converts to nitrogen	
d)	Ammonia + oxygen converts to nitrogen gas converts to nitrate	

Question 31		
One half of the surface media of a biological filter appears to have a distinctly different colour. What is the most likely cause?		
Possible answers		**Answer**
a)	The darker area is on the south side and receives more sun	
b)	The top of the media isn't level	
c)	The distributor arms are out of balance	
d)	Some of the air vents are blocked around that side of the filter	

Question 32		
Humus tanks are an essential part of any works utilising percolating filters. Generally, they can be divided into 3 types: Radial, Pyramidal and Rectangular. Which ONE of the following does **NOT** describe the flow path of a humus tank?		
Possible answers		**Answer**
a)	Horizontal flow	
b)	Radial flow	
c)	Circular flow	
d)	Upward flow	

Question 33		
A single stage filter works (with recirculation) has 74000m3 of filter media, a FTFT of 89300m3/d and an average settled BOD of 150mg/l. What is the correct Organic Loading rate of the site?		
Possible answers		**Answer**
a)	0.018kgBOD/m3/d	
b)	0.18kgBOD/ m3/d	
c)	18kgBOD/ m3/ d	
d)	180kgBOD/m3/d	

Question 34		
Which of the following is the biggest cost associated with running pumping stations?		
Possible answers		**Answer**
a)	Chemicals	
b)	Grounds maintenance	
c)	Maintenance of the building	
d)	Electricity	

Question 35		
Grit removal consists of slowing the flow through various means to 0.3 m/s to allow grit to drop out of suspension. What would a technician expect to observe in the grit skips of an optimised plant?		
Possible answers		**Answer**
a)	Relatively dry usually black grit, clean and free from organics	
b)	Rags , organics (sweetcorn, faeces etc.) relatively odorous and in large quantities	
c)	Nothing but a small amount of larger particles , clean and non-odorous	
d)	Mainly rainwater and tomato plants, some grit, production is obviously slow	

Question 36		
The Activated Sludge process (ASP) is experiencing foaming and poor settlement in the final tanks, leading to increased risk for BOD and solids failures. Microscopic evaluation indicates that the problem is Microthrix parvicella. What should a technician do?		
Possible answers		**Answer**
a)	It is an indicator of low load so MLSS (Mixed Liquor Suspended Solids) should be reduced	
b)	DO (Dissolved Oxygen) should be increased , regardless of the residual DO shown on the instruments	
c)	Hypochlorite dosing should be started on the SAS to stop reintroduction	
d)	A mechanical solution is the only real solution using skimmers and booms on the lanes	

[Please turn over for question 37]

Question 37		
Many sludge treatment centres have sludge digestion facilities and Combined Heat and Power (CHP). Gas production and subsequent power generation can vary with how the plant is operated. Which statement is correct?		
Possible answers		**Answer**
a)	A thick raw sludge feed helps to maintain: digester retention time; digester temperature; destruction of solids and pathogenic bacteria; gas production and power generation	
b)	Gas production is improved by a thinner sludge feed due to easier/faster mixing resulting in the bacteria accessing the organic food supply more quickly	
c)	Gas production improves with increased digester sludge feed volume regardless of sludge %DS	
d)	A thick raw sludge feed results in higher %DS in the digested sludge resulting in higher levels of pathogenic bacteria remaining in the sludge, which can detrimentally affect the availability of sludge recycling options	

Question 38		
Belt misalignment on a Gravity Belt Thickener (GBT) could damage the belt. What would be the most likely outcome of this?		
Possible answers		**Answer**
a)	Sludge spillages	
b)	Wasting poly leading to unnecessary costs	
c)	Excess solids in the filtrate	
d)	A build-up of hydrogen sulphide	

Question 39		
A technician discovers a pollution incident on a site. Within what timescale does the Environment Agency need to be informed?		
Possible answers		**Answer**
a)	30 minutes	
b)	1 hour	
c)	2 hours	
d)	3 hours	

Question 40		
A pumping station has 3 centrifugal pumps on a duty/assist/assist basis. Which ONE of the following actions will maximise its performance?		
Possible answers		**Answer**
a)	Extending the timing of planned preventative maintenance	
b)	A narrow band on pumping station start/stop levels	
c)	Air or gas locking of pump and associated pipework	
d)	Installation of high efficiency pump drives	

End of Sample Practice Assessment

ENERGY & UTILITIES INDEPENDENT ASSESSMENT SERVICE

Sample Practice Knowledge Assessment

Answer scheme

Question	Answer	Question	Answer
1	D	**21**	D
2	B	**22**	C
3	C	**23**	D
4	A	**24**	D
5	B	**25**	C
6	D	**26**	B
7	A	**27**	A
8	A	**28**	C
9	B	**29**	B
10	D	**30**	A
11	A	**31**	C
12	C	**32**	C
13	A	**33**	B
14	B	**34**	D
15	D	**35**	A
16	C	**36**	A
17	A	**37**	A
18	C	**38**	C
19	B	**39**	C
20	B	**40**	D